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ABSTRACT

The Beginning Teacher Evaluation Study (BTES), Phase II, was a research project on effective teaching behavior--what teachers do that significantly affects what and how pupils learn. The purposes of Phase II were to (1) develop an assessment system for measuring teacher and pupil behaviors and other factors which could influence each of them and their interrelationships and (2) generate hypotheses about the interrelationships among teacher and pupil behaviors and related factors. Forty-one second grade and 54 fifth grade experienced teachers participated in the study. This volume of the final report describes the APPLE (Anecdotal Processing to Promote Learning Experience) Observation System, a low inference descriptive record, which was used to specify the observable teacher and student behaviors. The behavior recording system employed in APPLE observations provided data on pupil behavior in reading and mathematics instruction, teacher responses to pupil behavior, the instructional contexts for both instructional areas at grades two and five, and the teaching activities which typified teacher behavior for these grades and instructional areas. Time duration data reflected time allocation of instruction in the several contexts which are common to the BTES classes. In general, the data reported here support the use of a behavior recording system as a valid tool for studying teacher performance characteristics. (RC)

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BEGINNING TEACHER EVALUATION STUDY
PHASE II 1973-74

FINAL REPORT

VOLUME III.1.

APPLE OBSERVATION VARIABLES AND THEIR RELATIONSHIP TO READING AND MATHEMATICS ACHIEVEMENT

BY

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BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME III.1.

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for the California Commission for Teacher Preparation
and Licensing and funded by the National Institute
of Education.

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PREFACE

The Beginning Teacher Evaluation Study (BTES) is a long-term project of the California Commission for Teacher Preparation and Licensing. The Commission is responsible for licensing teachers in California and is trying to determine what factors should be considered in this process.

The second phase of the study was conducted by Educational Testing Service for the Commission. Phase II was the hypotheses-generating and instrument-development phase of BTES. ETS had two tasks: (1) to develop an assessment system to measure both teacher and pupil behaviors as well as other factors which might be related to these behaviors; and (2) to generate hypotheses about the interrelationships between teacher and pupil behaviors and related factors.

The study was conducted in 43 schools in eight districts throughout the state of California. A total of 41 second grade teachers and 54 fifth grade teachers participated in the project during Phase II.

The final report for Phase II consists of several volumes. Volume I describes the design and rationale for the experimental design and data analysis procedures and includes the major findings of Phase II. Volume II describes the conduct of the field study and the sample of participants.

Because of the complex nature of Phase II, a variety of techniques was used to measure teacher and pupil behaviors. They are described in Volumes III, IV, and V. Results are also included in these volumes.

Volume III describes the observation systems in detail and is available in three separately bound sections. The first section, Volume III.1., describes the behavior recording observation system used in the project--APPLE (Anectdotal Process for Promoting the Learning Experience). Volume III.2. describes the category system used to observe classroom activities--

RAMOS (Reading and Mathematics Observation System). The third section of this volume, III.3., covers the videotaping of instructional activities during reading and mathematics.

Volume IV concerns other aspects of the measurement system and covers both the pupil and teacher test batteries.

The fifth volume covers a series of small studies done as part of Phase II. Volume V.1. looks at teacher aptitudes as related to teacher behaviors. Volume V.2. is concerned with the relationship between teacher expectations and pupil performance. Volume V.3. reviews performance of pupils in the BTES teachers' classrooms for two years prior to Phase II, the historical test data. Volume V.4. discusses the Diagnostic Film Test, a device designed to assess teachers' skills in diagnosing reading problems and prescribing corrective action. Volume V.5. summarizes the results of work diaries completed by the teachers on their reading and mathematics instructional program.

Information on the availability of these volumes can be obtained from:

Dr. Frederick J. McDonald
Educational Studies
Educational Testing Service
Princeton, NJ 08540

Information on other phases of BTES can be obtained from:

California Commission for Teacher
  Preparation and Licensing
1020 O Street
Sacramento, CA 95814

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Special thanks also to Cathleen Caffrey, Carolyn Urbanski and Jolinda Decad for their patience and accuracy in encoding the observations and to Charlene Forestener and Ronya Javkin for keypunching a very large number of observations with few errors and in record time. As always, Fred and Emily Converse, resident experts in the use of the APPLE computer programs, contributed immeasurably in managing the many steps of data processing and reduction which must precede analysis of a data base of this magnitude.

Several members of the ETS staff also deserve mention. Fred McDonald suggested amendments to earlier drafts of the report which greatly improved it as did Patricia Elias and Patricia Wheeler. J. Richard Harsh identified training sites and coordinated observation activities in the Southern California region. Sharon Tucker and Janice Jackson typed the report and Mary Corder coordinated the production of the report. Most importantly, Gail Hare gave generously of her time and talents in providing the editorial assistance needed to convert our "rough drafts" into the finished product.

Nadine M. Lambert
Carolyn S. Hartsough

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The APPLE Observation System

The objective of the classroom observations made in Phase II of the Beginning Teacher Evaluation Study (BTES) was to specify the observable teacher and pupil behaviors which affect pupil's learning. The APPLE (Anecdotal Processing to Promote the Learning Experience)* observation procedures used in the BTES project were developed by collecting natural classroom observations in over 150 classrooms of about 2000 elementary school children over a three year period. The observations obtained during this developmental period were used to define categories of observable pupil and teacher behaviors based on actual classroom occurrences. Rather than provide observers with categories or lists of behaviors developed on _a priori_ basis, we developed lexicons for teacher and pupil behavior on the basis of the events actually observed in the classrooms. The _Lexicon for Observation in the Schools_ (Lambert and Hartsough, 1971; Lambert, Hartsough, Caffrey and Urbanski, 1976) defines the universe of observable pupil and teacher behavior which characterized the Stress of School Project classrooms. These classrooms were heterogeneous with respect to urbanization, social status, ethnic status and classroom organization variables.

The lexicon is an open rather than a closed system for classifying observable behavior. The lexicon can be augmented by the addition of new entries within a category or with new categories at any time that an observable set of behaviors with similar characteristics cannot be adequately assigned an existing lexicon term or where new categories of observable behavior are required. A "computer name" is assigned to the new lexicon entry by following rules for machine sensibility, and the entry is defined operationally with examples of actual behaviors observed in schools. As the lexicon expands, it will ultimately define all observable school behaviors and the addition of new entries will rarely be needed.

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*The system was originally developed in the Stress of School Project supported by NIMH Grant No. MH 14605, 1968-73.

The open-ended nature of the APPLE naturalistic system made it ideally suited to the observational task for the BTES project. Rather than testing the significant relationship to achievement of a relatively small number of predetermined observational categories such as those defined in most category systems, all of the observable pupil and teacher events recorded by the APPLE observers in the classrooms of the BTES teachers could be examined for their relationship to school achievement. Therefore, a maximum amount of information was recorded, each item of which was available for analysis in terms of its relationship to the learning variables.

Description of the APPLE Observation System

The APPLE observation system (1) requires observers to provide low inference descriptions of pupil and teacher behavior, (2) specifies classroom organizational strategies, (3) describes teacher-pupil and pupil-pupil interactions, and (4) describes the content of the instructional program. Thomas (1932) and Haeberle (1959) pointed out that in order for the observer to become an efficient recording instrument in a classroom the observations must focus on overt, visible acts rather than concepts or categories which require inferences on the part of the observer. The effect of the observer on the setting in which he or she is observing must also be minimized (Prall, 1959), and the unit of behavior which is to be recorded must be defined. Biddle (1967) and Prall suggested that investigators specify whether the observers are to record the specific behaviors of a single child under a variety of circumstances or of a number of children in similar circumstances. In either case, they considered the selection of behavior in naturally occurring units rather than on the basis of time samples to be the more desirable schedule for observation.

In the developmental work for the APPLE system, we required observers to record their observations in descriptive, non-inferential terms, and we instructed them on methods of describing complete segments of a pupil's behavior. These segments or units of pupils' behavior are called "events" in the APPLE observational system. After several thousand events were recorded, we began the task of assigning descriptive labels to each event. These descriptive labels designated entries in the preliminary lexicon for observed behavior. We also required that the observers describe the teacher initiating behavior and the teacher response to each pupil event and not just observe teacher behavior in isolation of and irrespective of its effect on or response to pupil behaviors. In this way the observation system provided a basis for describing the characteristics of teacher behavior in relation to the behavioral characteristics of pupils. Since the APPLE Information System (Lambert, F. Converse, E. Converse and Hartsough, 1971) was designed to analyze elements of a classroom observation singly or in combination with other elements, the observation and computer retrieval procedures ensured the feasibility of analyzing the combinations of pupil and teacher behaviors which were of interest in a particular research or evaluation question.

The concept of an event in the APPLE Observation System. The term event has been used by other investigators to define a unit of behavior. Biddle (1967) conceived of behavior events as critical incidents or episodes requiring a record of the social context and environmental forces in order to be understood. Flanagan's critical incident technique (1959) requires a judgment, perhaps an inference, that an incident is "critical" for a child. Kowatrakul (1959) specified six categories of pupil-behavior events which were expected to occur in natural settings: task-oriented, social work-oriented, social-friendly, momentary withdrawal, intent on work in an academic area not assigned, and intent on work in a non-academic area.

Eiduson (1966) conceived of events as actual observed happenings as well as phenomena which could be inferred. She included the less "objective" types of event phenomena in PsyCHES (Psychiatric Case History Event System) because these were typical of psychiatric records, containing as they do, factual information, patient reports of symptoms, and clinical observations and interpretations of patient information.

The APPLE system originally conceived of an event as including anything that happened to a pupil, was observed to happen, reported to happen, or any information which would be pertinent to the pupil in school, especially the interaction of the pupil with his instructional program, his teachers and his peers. Our work for the Stress of School Project indicated that observers were most likely to record behavior which was academic-intellectual or social-emotional, which characterized a pupil's response to school, or which was descriptive of his behavior and appearance.

The concept of an event was revised somewhat after analyzing this preliminary work. In the present conceptualization, the structure of information which we call an event is focused on what an observed pupil is doing. Events describe what the pupil was observed to do and include statements about the antecedent conditions of the observed behavior, the teacher responses to the student if any, and the consequences of the behavior. The event in the APPLE system is written as a sentence and is accompanied by the antecedent/consequence descriptions. The accompanying information associated with the event is part of the data that the observer must record. By treating important antecedents and consequences of pupil events as different classifications of information, data from the APPLE observation system can be analyzed as a multiple category observation system in which the informational categories to be used can be selected for a particular research objective.

Mandatory information in the observation record. In the development of the APPLE Observation System, we considered observations to have limited informational value, if they were reported in isolation of descriptions of the setting in which they occurred. The design of the system and the computer retrieval options pe[illegible] several types of mandatory information to be carried along with the pupil event. The types of mandatory information which have been considered relevant to pupil events are (1) the instructional activities of the teacher, (2) the particular learning activity of the student, (3) the instructional context -- the relationship of the teacher to the instructional activity of the child (e.g., whether the pupil is working under the direct supervision of the teacher or whether he is working independently), (4) the response of the teacher to pupil behavior, (5) the location of the event, (6) the reporter or observer of the event, (7) the duration of the teacher activity, (8) the duration of the instructional context, and (9) the duration of the pupil behavior.

We designed the APPLE system in order to bring into focus as many relevant features of the classroom as possible for a particular research or evaluation question. The types of mandatory information can vary. In the Stress of School Project we requested the observer to report the learning activity of the child, the instructional context, the location of the event, and the reporter of the event. Teaching activities and duration of behaviors were carried in the annotation. In specifying the observation porcedures for the BTES project, we selected teacher instructional activity (teacher activity), pupil learning activity (pupil activity), instructional context (context), and teacher response as the mandatory information for each pupil event. Figure 1 presents a model of the major categories of data used by the observer in the BTES project. The figure indicates that specific responses of teachers and pupils are recorded within a particular teaching activity and instructional context.

Figure 1

Diagram of the Relations Among the Major Categories of Observation

Instructional Context					
Context I			Context II		
Teacher Activities	Pupil Events	Teacher Responses	Teacher Activities	Pupil Events	Teacher Responses
A	E_a	R_a	D	E_d	R_d
	⋮	⋮		⋮	⋮
	E_n	R_n		E_n	R_n
B	E_b	R_b	E	E_e	R_e
	⋮	⋮		⋮	⋮
	E_n	R_n		E_n	R_n
C	E_c	R_c	F	E_f	R_f
	⋮	⋮		⋮	⋮
	E_n	R_n		E_n	R_n

The selection of mandatory information for the BTES observations employed observational categories for which we had developed lexicons in the Stress of School Project. Complete lexicons for pupil events and teacher responses, as well as preliminary lexicons for teacher activity and pupil activity were developed in the Stress of School Project. The observations for the Stress of School Project had been obtained during the entire school day. Thus, the pupil activities and teacher activities which had been identified represented a more comprehensive set of entries than would be expected in the BTES observations, which focused on characteristics of pupil and teacher behavior occurring in the classroom during reading and mathematics instruction.

The task of developing a lexicon for the BTES data necessitated the careful examination of all of the pupil and teacher activities likely to occur as reading and mathematics were taught. We designed the observation form so that the observer was required to write a description of the teacher and pupil activity along with the pupil event and teacher response. This requirement for additional English language entries rather than a single word description or label yielded a complete record of the types of teacher activities and the specifics of pupil learning activities which occurred during the 200 days of APPLE observations. From these records we developed additional entries for the lexicon based on the descriptions of actual observed teacher and pupil activities in reading and mathematics in the BTES classrooms. To the extent that these classrooms represent a population of classrooms at second and fifth grades, the lexicons are comprehensive enough to define the range of teacher and pupil activities during reading and mathematics instruction.

Summary and description of major categories of observation used in BTES. In order to enable the reader to understand the scope and structure of the APPLE Observation System as it was used in the BTES Project, a more complete explication of the five major categories of information is presented here. It should be again noted that APPLE is not a "category rating system". However, to best meet the objectives of the BTES in defining teacher/pupil behavior relevant to pupil outcomes, the variables to be examined in this report are the lexicon items from the five major sets of mandatory information selected for use in BTES. These five types of mandatory information are as follows:

> Instructional Context. As noted earlier, the concept of an instructional context defines the relationship of the teacher to the instructional activity of the pupil. There are six major contexts, ranging from the teacher directing the activities of the entire class to an individual student working or playing independently of the teacher's direction and independently of the other children in the class. Table 1 presents the list of instructional context lexicon items.
>
> Teacher Activity. This category of variables focuses on the instructional activities of the teacher, and may be thought of as antecedent behavior in a continuum of observation variables. As the lexicon is constructed, various teacher activities appear under the headings "Instructing", "Organizing", "Preparing", "Assigning", "Discipline", and "Miscellaneous". Examples of "Instructing" behavior include "Answering questions", "Explaining a lesson", or "Introducing new material". Table 2 delineates the full range of teacher activities.
>
> Pupil Events. This category focuses on the observed behavior of the pupil. The reader should refer back to the discussion of the concept of an event in the APPLE system to gain a more complete understanding of the nature and limits of pupil events. Very basically, a pupil event is what the pupil is observed to do at a point in time. The complete lexicon of pupil events contained in Table 3 gives an idea of the large range of pupil behaviors described by the APPLE system.

Teacher Responses. This category describes the consequent teacher behavior to a pupil event. The lexicon includes descriptors which can be subsumed under three major headings: "Classroom Management Strategies", "Teacher Attitudes", and "Teacher Communications". Examples of teacher responses are "Criticism", "Ignoring", and "Praise". Table 4 provides the APPLE Teacher Response Lexicon.

Pupil Activities. The various learning and other activities a pupil engages in during the school day are described by the pupil activity lexicon. Some examples of reading activities are "Phonics" and "Punctuation". Examples of mathematics activities are "Division" and "Graphing". The APPLE Lexicon of Pupil Activities is provided in Table 5. Pupil Activities were used in this study to sort the observations into those associated with reading and those associated with mathematics instruction.

Table 1

APPLE Instructional Context Lexicon

Abbreviation	Context Name
T-CLASS	Teacher-Class
A-CLASS	Adult-Class
T-GROUP	Teacher-Group
A-GROUP	Adult-Group
T-INDIVID	Teacher-Individual
A-INDIVID	Adult-Individual
I-CLASS	Independent-Class
I-GROUP	Independent-Group
I-INDIVID	Independent-Individual
TRANSI-TIONAL	Transitional
TEST	Test

Table 2

APPLE Teacher Activity Lexicon

Abbreviation	Activity Name	Abbreviation	Activity Name
	INSTRUCTING		ORGANIZING
ANSWER	Answering questions	ACADORG	Academic organizing
ASKING	Asking questions	ATTENTN	Attention calling
CHECKNG	Checking work	CHGLESS	Changing lesson
CRCULAT	Circulating	DIRCTNS	Direction giving (organizational)
CORRECT	Correcting work	NONACAD	Non-academic organizing
DEMONST	Demonstrating	ANNOUNC	Procedural announcement
DICTATE	Dictating		
DISCUSS	Discussion leading		PREPARING
EXPLAIN	Explaining	ARRANGE	Arranging room
HELPING	Helping	COLLECT	Collecting materials
INSTGIV	Instruction giving	DISTRIB	Distributing materials
INTRODC	Introducing new material (subject matter)	PLANLES	Lesson planning
		RETURN	Returning materials
LECTURE	Lecturing	SET UP	Setting up equipment
LISTEN	Listening	ATBOARD	Writing at board
QANDANS	Question and answer		
READ TO	Reading to		ASSIGNING
REVIEW	Reviewing		
REWARD	Rewarding	ASSIGN	Assignment giving
SUPRVIS	Supervising	ERRCORR	Error correction
TALK TO	Talking to	EXERCIS	Exercises
TESTING	Testing	HOMEWRK	Homework
WORKWTH	Working with		

Table 2 -- continued

Abbreviation	Activity Name	Abbreviation	Activity Name
	DISCIPLINE		MISCELLANEOUS
NAMECAL	Calling out name	AT DESK	At desk working
DISCIPC	Disciplining class	CLEANUP	Clean up
QUIETNG	Quieting	OUTROOM	Out of room
RULEGIV	Rule giving	SOCIALP	Socializing with pupils
WAITING	Waiting	SOCIALA	Socializing with adults

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Table 3

APPLE Pupil Event Lexicon

Abbreviation	Event Name	Abbreviation	Event Name
	ACADEMIC PERFORMANCE, ABILITIES AND INTERESTS		ORIENTATION TO INSTRUCTION
ABILITY	Ability	ATN-GTNG BEH	Attention-getting behavior
ACAD PRFRMNC	Academic performance	ATTNTVNESS	Attentiveness
ACTIVITIES	Activities	BOREDOM	Boredom
CNCPT LRNING	Concept learning	CHEATING	Cheating
CNVRGNT PROD	Convergent production	CONDUCT	Conduct
DIVRGNT PROD	Divergent production	COOPERATION	Cooperation
EVALUATION	Evaluation	DAYDREAMING	Daydreaming
GNRL-KNOWLDG	General knowledge	DRCTN-FLLWNG	Direction-following
INTERESTS	Interests	DISENGAGEMNT	Disengagement
INTLCTL FUNC	Intellectual functioning	DSRPTV CNDCT	Disruptive conduct
LANGUAGE	Language	DISTRACTBLTY	Distractibility
LISTEN COMP	Listening comprehension	DIV TACTICS	Diversionary tactics
MEMORY	Memory	ENGAGEMENT	Engagement
NMBR CONCPTS	Number concepts	EGRESS	Egress
ORAL READING	Oral reading	FAILTORESPND	Failure to respond
PHONIC SKILL	Phonic skills	IMPERTINENCE	Impertinence
PROB SOLVING	Problem solving	INATTENTION	Inattention
READING COMP	Reading comprehension	PRTICIPATION	Participation
READNG VOCAB	Reading vocabulary	PUNCTUALITY	Punctuality
SHAPES-FORMS	Shapes and forms	QUESTIONING	Questioning
TEST PRFRMNC	Test performance	REASSURANCE	Reassurance
VOCABULARY	Vocabulary	RESISTANCE	Resistance
		SITTING BEH	Sitting behavior
		STUDENT WISH	Student wish
		TALKING	Talking
		VOLUNTEERING	Volunteering
		WANDERING	Wandering
		WORK HABITS	Work habits

Table 3 -- continued

Abbreviation	Event Name	Abbreviation	Event Name
	SOCIAL INTERACTIONS		AFFECTIVE BEHAVIOR
AGGRESSION	Aggression	AFFECT	Affect
ANTI-SOC BEH	Anti-social behavior	ANGER	Anger
CARE-TAKING	Care-taking	BIZARRE BEH	Bizarre behavior
COMPETITION	Competition	COMPLAINING	Complaining
CONFORMITY	Conformity	CRYING	Crying
CNTROLNG BEH	Controlling behavior	ENTHUSIASM	Enthusiasm
COPYING	Copying	FANTASY	Fantasy
FIGHTING	Fighting	FRUSTRATION	Frustration
IMITATION	Imitation	GIGGLING	Giggling
MEDDLING	Meddling	HURT FEELING	Hurt feelings
PLC IN CLASS	Place in class	NERVS HABITS	Nervous habits
PLAY BEHAV	Play behavior	SULKING	Sulking
PHYS CONTACT	Physical contact	TANTRUM	Tantrum
PUPIL HELP	Pupil help	WHINING	Whining
RIVALRY	Rivalry	YELLING	Yelling
SEXUAL BEHAV	Sexual behavior		
SHYNESS	Shyness		
SOCL RLTSHPS	Social relationships		
SPEAKING	Speaking		
TATTLING	Tattling		
TEASING	Teasing		

Table 3 -- continued

Abbreviation	Event Name	Abbreviation	Event Name
	PERSONALITY TRAITS AND ATTITUDES		PHYSICAL CHARACTERISTICS AND ACTIVITY
ADJUSTMENT	Adjustment	ACTIVTY LEVL	Activity level
ANXIETY	Anxiety	ATTIRE	Attire
ATTITUDE	Attitude	AUTO-EROTIC	Auto-erotic
DECISION-MAK	Decision-making	EATING BEHAV	Eating behavior
DEFENSIVNESS	Defensiveness	FATIGUE	Fatigue
DEPENDENCY	Dependency	HANDEDNESS	Handedness
FEAR FAILURE	Fear of failure	HEARING	Hearing
INDEPENDENCE	Independence	HUNGER	Hunger
MATURATION	Maturation	IMPLS CONTRL	Impulse control
MOOD	Mood	MOTOR BEHAV	Motor behavior
PERSISTENCE	Persistence	NEURO FACTRS	Neurological factors
PRSNL CHRACT	Personality characteristics	ORGANC SIGNS	Organic signs
PRSNLTY TYPE	Personality type	PHYS APPRNC	Physical appearance
POSSESSIONS	Possessions	PHYS COORDN	Physical coordination
RESPONSIBLTY	Responsibility	RESTLESSNESS	Restlessness
SELF-AWARNSS	Self-awareness	SLEEP BEHAV	Sleep behavior
SELF-CONCEPT	Self-concept	SUCKING BEH	Sucking behavior
SEX ATTITUDE	Sex attitude	TOILET BEHAV	Toilet behavior
		VISION	Vision
		VIS-MOT ORG	Visual-motor organization

Table 3 -- continued

Abbreviation	Event Name	Abbreviation	Event Name
	FAMILY HISTORY AND CHARACTERISTICS		HEALTH AND ILLNESS
		HOSPITLIZATN	Hospitalization
ADOPTION	Adoption	ILLNESS	Illness
ALCOHOLISM	Alcoholism	INJURY	Injury
CHILD CARE	Child care	MED HISTORY	Medical history
CONFRNC BEH	Conference behavior	MED TREATMT	Medical treatment
DEATH	Death	MEDICATION	Medication
DIVORCE	Divorce	NOSEBLEED	Nosebleed
EDUC HISTORY	Education history	PHYS COMPLNT	Physical complaint
FAMLY BACKGD	Family background	PHYS CONDITN	Physical condition
FAMLY CONCPT	Family concept		
FMLY CNSTLTN	Family constellation		ADMINISTRATIVE-OTHER
FMLY RLTSHPS	Family relationships	ADMN NTRVNTN	Administrative intervention
FMLY STUATN	Family situation	ADLT MNAGMNT	Adult management
FOREIGN LANG	Foreign language	ATTENDANCE	Attendance
MARTL SPRATN	Marital separation	OBSVR JUDGMNT	Observer Judgement
OCCUPATION	Occupation	RECOMMENDATN	Recommendation
OVER PROTCTN	Over protection	SCHEDULING	Scheduling
PARNTL PRSSR	Parental pressure		
PARNT REQUST	Parental request		
PLC IN FAMLY	Place in family		
RACE	Race		
REJECTION	Rejection		
SCHL SUPPORT	School support		

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Table 4

APPLE Teacher Response Lexicon

Abbreviation	Response Name	Abbreviation	Response Name
	CLASSROOM MANAGEMENT STRATEGIES	RPRIMND	Reprimand
ACCEPT	Acceptance	REWARD	Reward
ASSIGN	Assigning	SEATING	Seating
CORRECT	Correcting	WARNING	Warning
CRITICSM	Criticism		
DEFEAT	Defeat		TEACHER ATTITUDES
DISCIPLN	Discipline	AFFECT	Affect
ENCRGMNT	Encouragement	CHANGE	Change
EXPLAIN	Explaining	CONCERN	Concern
HELP	Help	CONFIDNC	Confidence
IGNORING	Ignoring	DISAPPNT	Disappointment
IND INST	Individualized instruction	JUDGMENT	Judgement
NHBTCOMM	Inhibition of communication	RESISTNC	Resistance
INSTRUCT	Instructing		
INTRVNTN	Intervention		TEACHER COMMUNICATIONS
MANAGMNT	Management	PAR-TCH	Parent-Teacher communication
MEDIATN	Mediation	COMPLNT	Complaint
MOVES ON	Moves on	INFORM	Information giving
NEG FEED	Negative feedback	REQUEST	Request
PERMITS	Permits		
PHYS PUN	Physical punishment		
POS FEED	Positive feedback		
PRAISE	Praise		
QUESTION	Questioning		
REASSURE	Reassurance		
RECOGNIZ	Recognizing		
REDIRECT	Redirection		
REFUSES	Refuses		

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Table 5

APPLE Pupil Activity Lexicon

Abbreviation	Activity Name	Abbreviation	Activity Name
	READING ACTIVITIES		MATHEMATICS ACTIVITIES
SLT READ	Assigned silent reading	ADD	Addition
WRITING	Assigned writing	BASIC	Basic facts
COMPFACT	Comprehension-literal facts	DECIM	Decimals
COMPIDEA	Comprehension-main ideas	DIV	Division
CWRITE	Creative writing	FACTOR	Factoring
DCTIONRY	Dictionary skills	FRACT	Fraction
DICTATN	Dictation	GEOM	Geometry
ENGLISH	English	GRAPH	Graphing
GRAMMAR	Grammar	MATH	Math
ORALREAD	Oral reading	MWKSHEET	Math worksheet
PEN	Penmanship	MEASURT	Measurement
PHONICS	Phonics	MONEY	Money
POETRY	Poetry	MULT	Multiplication
PUNCT	Punctuation	PERCENT	Percent, ratio probability
REDINSS	Readiness activities	RELATS	Relationships
READING	Reading	SUB	Subtraction
RDNG WBK	Reading workbook	STAT	Statistics (mean, median, etc.)
RWKSHEET	Reading worksheet	TIME	Time
REC READ	Recreational reading	WORDPROB	Word problems
SPELL	Spelling		
SPELLWBK	Spelling workbook		
SYLLABL	Syllabification		
VOCAB	Word meaning		

Table 5 -- continued

Abbreviation	Activity Name	Abbreviation	Activity Name
	ACADEMIC ACTIVITIES other than reading and mathematics	BLOCKS	Blocks
ANTHRO	Anthropology	CLAP	Clapping
ART	Art	CLAY	Clay
BOOK RPT	Book report	COLOR	Coloring
COLORS	Colors	COOK	Cooking
EVENTS	Current events	CRAFTS	Crafts
DRAMA	Drama, play	DANCE	Dancing
ECOLOGY	Ecology	FREEPLAY	Freeplay
FILM	Film strip, movie	FREETIME	Freetime
FOOD	Food study	GAMES	Games
GEOG	Geography	MARCH	Marching
PHYS ED	Physical education	BODY MOV	Body movement
SHAPES	Shapes and forms	MUSIC	Music
SOC STUD	Social studies	PAINT	Painting
SCIENCE	Science	PLAY HSE	Playhouse
		RECESS	Recess
	TRANSITIONAL ACTIVITIES	RECORDS	Records
TRANS	Transitional	RHYTHM	Rhythm
CLEAN UP	Clean up	SING	Singing
END DAY	End of the day	SPEECH	Speech
LINE UP	Line up	STORY	Story
QUIET	Quiet	TELLSTRY	Tell-a-story
REST	Rest		
SNACK	Snack, milk-time		

Table 5 -- continued

Abbreviation	Activity Name	Abbreviation	Activity Name
	OPENING ACTIVITIES		MISCELLANEOUS ACTIVITIES
PLEDGE	Pledge	ASSEMBLY	Assembly
ROLL	Roll-call	CONFRNC	Conference
OPENING	Beginning of day activities	DISCUSS	Discussion
SHARING	Sharing	ELECT	Election
		IND ACT	Individual activities
		LIBRARY	Library
		LUNCH	Lunch
		PARTY	Party
		READER	Weekly Reader

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Observing the Duration of Classroom Behavior

For some time we have considered the duration of pupil behavior to be an important classroom variable. Duration of behavior can be defined as the proportion of classroom time a particular behavior was observed to occur or else as the duration of continuous pupil behavior. There are several ways in which to record the duration of behavior in studies of pupil and teacher performances.

One can focus on the duration of pupil behavior, or one can record the duration of teacher behavior such as the length of time teachers are involved in particular teaching activities. Since the objectives of the BTES project were to define teacher performance variables in relation to reading and mathematics pupil outcomes, we selected the duration of instructional contexts as the most efficient way to appraise the setting in which instruction was offered and in turn to estimate the effect of the length of time teachers were engaged in different patterns of teacher-pupil interactions.* (Refer to Table 1 for the list of contexts.) The extent to which teachers elect different patterns of teacher-directed activity in reading and mathematics has been found to vary over classrooms. For example, some teachers conduct their reading classes almost entirely in a teacher-group context while others rely heavily on independent-individualized assignments. Therefore a time log of the duration of various teaching contexts appeared to be extremely relevant data on the amount of teacher-directed learning activity.

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*If the observation task had been based in high schools where the context of instruction rarely changes in an instructional period, time logs of the duration of differing contexts might not be as useful data for the study of teacher performance. At the high school level, the observation task might be more productive of crucial teacher data if time logs were based on time spent in differing types of teacher activities.

After each observation period, the APPLE observer completed a summary report form on which he or she indicated the time each observed pupil spent in different instructional contexts. In addition, the learning tasks in which each pupil engaged and the materials involved in the task were recorded. These summary report forms were used in the debriefing sessions with the teacher on the observation day. The teacher could make corrections in the information recorded, with particular attention to those sections about activities and materials which the observer might not have been able to complete correctly. In the debriefing sessions the observer and teacher also reviewed the time in context entries to see if they agreed with the teacher's plan for the day.

While we expected that the way the teacher administered the classroom, in terms of the distribution of time in different contexts, would have an effect on instruction, we also believed that different types of pupils would respond more favorably to one type of context than another. In order to check the reasonableness of this assumption, we asked the observer to estimate the proportion of pupil time in each context which would be considered productive involvement in the assigned learning task. We did not expect precise estimates since some inference is involved in making such judgments. However, we did believe that the estimate of proportion of productive time in different instructional contexts would be a more accurate estimate than asking the observer to make an overall rating of productivity at the end of the observation period.

Procedures for Conducting the BTES APPLE Observations

In the adaptation of the APPLE Observation System to the BTES project, the BTES objectives were compared with the types of data which could be derived from the APPLE Observation System. We considered the teacher performance variables which our previous research suggested were likely to affect achievement and attitude outcomes, the procedures for observation which were most likely to produce that kind of crucial information, and the methods of training to be employed in preparing new observers for the task. The identification of salient features of the APPLE Observation System which were applicable to the BTES objectives has been made in the previous section and an overview of the APPLE Observation System has been provided. This portion of the report describes the training activities and the methods by which the observations were obtained.

Preparation of the Observation Manual for the BTES Project

Prior to the training sessions for the BTES observers, we prepared an APPLE observation manual for the BTES project. This manual included a description of the system, the goals of the observers in the BTES project, the procedures for collecting observations, and guidelines which defined the methods for making, recording and summarizing observations. This document, "Instructions for APPLE Observers in the Beginning Teacher Evaluation Study", is reproduced in Appendix D of this report. In addition to the manual we prepared the APPLE Observation Form and the Observer Summary Report which are described below.

The Observation Forms

The APPLE observation work for the BTES project involved two forms. The first was the APPLE Observation Form (Figure 2) on which the observer described the pupil events and instructional contexts along with the attendant teacher activities, pupil activities and teacher responses. On this form the observer made a record of the time at which the context changed for each observed pupil. The space on the form for time entries was to be filled in only when there was a change in instructional context. The Observer Summary Report (Figure 3) summarized the duration of different instructional contexts for reading instruction and for mathematics instruction. At the end of each observation period, the observer completed this form using the context time entries and the time designation entered at the top when each new APPLE Observation Form page was begun.

The reader will note that a space on the observation form provides for an observer rating of the "quality of pupil behavior". We asked observers to rate as " + " pupil behavior which they considered to be positive and appropriate for classroom expectancies. They rated as " - " only those behaviors which were inappropriate to the ongoing classroom activities. If there was no basis on which to make a judgment of positive or negative pupil behavior, the observer recorded a "0". We recognized that adding this rating to low inference observation procedures might introduce unreliable and less objective data to the observations. We nevertheless included these ratings in an effort to incorporate as much of the observer's experience in the classroom as possible.

The observers made their records continuously on the APPLE Observation Forms during the observation periods. In some classrooms reading

Figure 2

APPLE Observation Form

APPLE OBSERVATION FORM

Time ☐

OBSERVER	DATE	TEACHER	GRADE

CODE	EVENT NAME	SUBJECT	PUPIL ACTIVITY	CONTEXT	Time: Start____ End____	TEACHER ACTIVITY	TEACHER RESPONSE

Quality of Pupil Behavior ☐- ☐0 ☐+

Description of Event:

Teacher Response:

Teacher Activity:

CODE	EVENT NAME	SUBJECT	PUPIL ACTIVITY	CONTEXT	Time: Start____ End____	TEACHER ACTIVITY	TEACHER RESPONSE

Quality of Pupil Behavior ☐- ☐0 ☐+

Description of Event:

Teacher Response:

Teacher Activity:

CODE	EVENT NAME	SUBJECT	PUPIL ACTIVITY	CONTEXT	Time: Start____ End____	TEACHER ACTIVITY	TEACHER RESPONSE

Quality of Pupil Behavior ☐- ☐0 ☐+

Description of Event:

Teacher Response:

Teacher Activity:

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Figure 3

Observer Summary Report

OBSERVER SUMMARY REPORT

Observer__________ District__________ School__________ Teacher__________ Grade______

Date__________

Time Observation Began______
Time Observation Ended______
Total Time (min.)______

Total Enrolled______
White______
Black______
Spanish______
Other______

Total Absent______
White______
Black______
Spanish______
Other______

Code	Name of Pupil	P A	For Each Observed Pupil During Observation Period What Was:			For Each Context					*	* *
			Primary Pupil Activity	Material Used	Focus of the Learning	Context	Time in Context		Productivity		G S O P	D L A
							Min.	% Tot. Time	Min.	% Tot. Time		
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						

*Extent of Structure in Observation Period

1 = no structure evident
2 = some structure evident
3 = considerable structure evident
4 = activities were completely structured

**Differentiation of Learning Activity

1 = pupil assignment the same as everyone else in class
2 = pupil assignment the same as group and the group assignment not the same as the rest of the class
3 = pupil assignment individualized and not the same as any other child or class

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and mathematics instruction were carried on simultaneously.* More typically, teachers had specific periods for reading and mathematics lessons.

The Observer Summary Report detailed the time allocation in the different instructional contexts separately by reading and mathematics. In "open" or "individualized" classrooms, observers differentiated between reading and mathematics instruction by using the time entries on the observation form and the descriptions of the pupil activity. The Observer Summary Report provides spaces for the observer to enter the pupil activity for each context and the materials which were being used. The caption "Focus of learning activity" was completed with the teacher in order to specify as precisely as possible the objectives for the instruction and to use this information to correct any observer misapprehensions about their records of pupil activity.

At the completion of each day's observations, the observer entered the code number of each pupil on the APPLE Observation Forms and reviewed the completed English language descriptions of pupil events, teacher activity and teacher responses. These materials, in addition to the two completed Observer Summary Reports, were sent to the Berkeley office of Educational Testing Service and transferred to the University of California at Berkeley where the observations were encoded and prepared for data processing.

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* Ordinarily these simultaneous pupil activities would make observations very difficult. In this study, any difficulty was resolved by observing specific pupils who had been chosen for observation prior to the actual observation. Thus, whether the reading or mathematics instruction was observed depended on which pupils were being observed. The methods for selecting the pupils to be observed are described later in this chapter.

Observer Training Activities

With only a few exceptions, the APPLE observations were made by observers new to the activity. We selected observers on the basis of prior experience in school settings as classroom aides, as graduate students in education and psychology with field experience in schools, or as teacher education students. We selected observers who were likely to have no heavy investment in particular types of reading and mathematics instructional methods. In addition to these selection criteria, we considered the general demeanor and appearance of the observers and the inferences likely to be made about their neutrality and objectivity. Since an observer was to make only one observation in some classrooms, his or her ability to "fit in" with the school and the classroom was an important factor in minimizing potential classroom disruption because of the observation activity. All potential observers were interviewed by ETS professional staff and the authors of this chapter.

The selection process was intended to identify observers who presented an unbiased attitude toward teachers and pupils, who seemed able to handle communication crises and scheduling breakdowns, and who could cope with eventual unexpected occurrences such as teachers misplacing the scheduling information about observations, or observers arriving for observation on a day when there was a substitute teacher.

The training sessions involved several steps. Over an initial three day period, we met with observers to review the "Instructions for APPLE Observers in the Beginning Teacher Evaluation Study" and the two APPLE forms and to discuss the methods for the observations. We had copies of the BTES project goals at hand to describe the purpose of the observation procedures and how the observations related to the total study. We reviewed these materials with the observers, went through examples of observation records, and scheduled actual practice observation sessions in elementary school classrooms which were not in the BTES sample. In these training sessions we paired-off an experienced observer and a trainee in several second and fifth grade classrooms. On the initial observation day, the trainee was required to explain the purpose of the observations to the principal and the teacher. Then the two observers selected six students from the volunteer classroom for the trial observations. They made records during reading and mathematics lessons and returned for a training session at the local project office in the afternoon. In these afternoon sessions, we reviewed the manner in which the trainee had explained the project, discussed any particular problems which might have occurred with the teachers, and discussed the content of the observation records. This procedure was repeated on a second day and included another training review session.

The final training period centered on observation encoding. Even though the observers would not be required to encode observations, we believed that it was important for them to understand the methods which were to be used so that their records would be completed properly. We continued to remind them that a good observation was one that could be encoded, that is, one which was described clearly enough so that lexicon names could be assigned to the pupil events and the mandatory information.

Then all observers completed at least four BTES observation days, after which we held a second group training session. At this time we brought examples of their observations and pointed out instances where the information was incomplete or ambiguous. We discussed scheduling and procedural problems in the schools, and made an effort to prevent future difficulties by communicating our findings to the ETS Berkeley Office, where the system for scheduling the observations was implemented.

The group training sessions emphasized common kinds of observer problems. There was constant monitoring of each observer's records as they were returned for processing. Any incomplete records were annotated and returned to the observer for resubmission. This procedure established a constant monitoring and feedback system for each APPLE observer.

Observation Schedules

The schedule for observations followed the research design developed for this project (see Volume I for the description of this design). Schools and teachers were informed of the observation days. APPLE observers received copies of the observation schedule and a list of the target pupils to be observed from the ETS project office in Berkeley.

The ETS project team had established two patterns of observation scheduling. The first was a four-day schedule of paired observations for a 25 classroom subset of the BTES teachers selected to be demographically representative. Four of the eight observations for each classroom were APPLE observations distributed throughout a two month period. On two of the four days an APPLE observer was paired with a RAMOS observer; on a third day, two APPLE observers were present; and on the fourth day, two RAMOS observers were in the classroom.*

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*The observation system RAMOS (Reading and Mathematics Observation System) is described elsewhere in this report.

Three observations were made in the remaining 70 classrooms. Depending on the schedule, we conducted one or two days of APPLE observations in these 70 classrooms. Volume II, "Description of the Field Study and Sample", details the procedures for the observation schedules and provides information about the way the schedule accommodated the data collection for the two different observation systems.

At the conclusion of the APPLE observations, each classroom had been observed one, two or four times and within these sets of observations there were 20 different classrooms which were observed simultaneously by two APPLE observers. Although simultaneous APPLE observations had been planned for 25 BTES classrooms, only 20 were actually observed concurrently. This departure from the original plan occurred because of difficulties encountered by some observers in keeping scheduled appointments, largely as a consequence of the fuel shortages experienced in California during this time period. These simultaneous observation days permitted an analysis of several possible sources of error in the observation system. Appendix A presents the results of an investigation of the reliability of the observational data for the BTES study.

Identification of the Pupil Sample for Observation

We recognized that observing all pupils would not be appropriate for a short term observation schedule such as the one used in BTES. It was necessary to select a subset of pupils for observation who were representative of the pupils assigned to each classroom. This subset of pupils was called the target group.

Using Fall reading performance data and teacher rankings of expected level of reading achievement, eight target pupils were selected in each classroom. All pupils in each class were classified in the following matrix:

		Achievement	
		H	L
Expectation	H		
	L		

The median was used to separate the data into high and low categories. The achievement data used were the total scores for reading and mathematics on the California Achievement Test. The sorts were made separately for reading and mathematics, but the target students were selected by using the reading matrix except where the data were not available. In such cases mathematics data were used.

The target pupils included one boy and one girl each from the top, from just above the middle, from just below the middle, and from the bottom of the distributions in each classroom. The target group included minority pupils in about the same proportion as in the total classroom. An alternate pupil was chosen for each target pupil in the event the target pupil was absent. While there had to be alternate selection procedures in the absence of reading scores, or teacher rankings, the procedure described above was used to select most of the pupils.[5]

Observation Procedures for the Target Pupils

In advance of the observation day, usually the day before, each observer contacted the teacher to be observed and asked him or her to have available large pressure-sensitive labels to make a name tag for each pupil in the classroom. In case the teacher had forgotten to provide these labels, the observers carried extra labels. In this way the target pupils could be identified without their knowing that they were the special object of the observer's attention.

The observers assumed a role in the classroom somewhere between participant observer and "potted palm". Depending on the activities being carried on by the pupils and the teacher, the observer positioned himself or herself in the classroom for maximum visual access to the activities and behavior of the target pupils.

To do their job, the observers had to move into positions where they could see and hear the target pupils, hear the teacher when he or she talked to the pupil being observed, and see the materials the pupil was using. When a pupil to be observed was working independently, the observer had to move to a position from which he or she could see what the pupil was doing. The rule was always to be in a position where the pupil could be seen or heard and yet be as unobtrusive as possible.

The observers were instructed not to intrude in any way in any classroom activity. Pupils, however, view any adult present in the class as a potential resource. On occasion, pupils asked the observer a question. The observers were instructed to answer very simple questions, many of which were social in character, such as "Will you be here tomorrow?" If the pupil asked a simple question about his assignment, for example, how to spell a simple word, the observer answered because this response was the least disruptive. But the observer did not remain to help the pupil. If the question was more complicated or required an explanation, the observer referred the pupil to the teacher. The observers reported that these content questions were relatively infrequent. Teachers did not complain about the observers interfering with instruction.

In general we tried to create a situation in which the natural conditions of the classroom were unchanged even though an observer was present. The role of the observers had been explained to the teachers; the observers were thoroughly instructed on their role. We trusted the teachers to treat the observers as they usually treated other adults who came into their classrooms.

Frequency of Observation Records

There were no fewer than three periods of observation during the school day. If the information was not available in advance, the observer consulted the teacher about the times when reading (usually two periods) and mathematics (usually one period) were taught. These periods, plus any other periods that the teacher designated as ones in which the observer could observe pupil and teacher behaviors associated with reading and mathematics, constituted the times for observation. Normally this amounted to four half-hour sessions a day, though there were some classrooms where observations were continuous over an entire morning or where the daily schedule in the classroom was otherwise different.

The observation record describes pupil behavior and teacher-pupil interaction as well as the instructional role of the teacher. On the observation form the observer noted the teacher activity which initiated or accompanied the reading or mathematics lesson. Typically the observers simply described the teacher activity at the beginning of an observation period, when the context changed or when the teaching activity within the context changed. These activities included explaining the instructions for a lesson, organizing the lesson activity, working with pupils on an assignment, conducting a discussion, lecturing, or leading a question and answer session. (See Table 2 for the Lexicon of Teacher Activities.)

After noting the general teacher activity and recording the time of day, the observer made an observation record of the behavior of each pupil on the list of target pupils, including in each observation the mandatory information for behavior events. With the exception of context and Pupil Activity, this mandatory information was recorded in English language phrases or sentences, as was the description of the pupil event. Following this initial record of each pupil's behavior, the observer continued to make observations, usually no less than two for each five minute period, and as often as needed to provide a complete record of each target pupil's behavior. Each time the context changed, the observer made a record of the time the new context began, and a record of each pupil's behavior in the new context.

Principles of Sampling Behavior to be Observed

The principle used to make rules for sampling observable events is that each event has an equal chance of being observed. This principle means that an unbiased sample of events must be produced by the observational processes used. There are two ways in which this principle may be violated in making observations in the classroom. The observer may, through a personal bias, look at only those events which catch his or her attention. The observer may fail to see an event because of the physical limitation of the observational setting.

The first of these potential difficulties may be eliminated or ameliorated by using one or more of the following procedures. The observer is instructed to record every event occurring at a specific point in time, and is further instructed to make time-samples at regular intervals. The result is a record of everything occurring at periodic intervals which, if sufficiently close together, yields an approximation of a continuous record.

Another way to control for bias in the sample of events is to take place-samples, that is, to record everything occurring in a locale within a larger environment. This procedure yields a different picture than a time-sample.

A third way to reduce bias is to record the actions of a person or persons. When this procedure is used the persons must be a representative sample of the persons in a larger set.

Each method makes an assumption. The first method assumes that time-samples represent the frequency with which the events actually occurred. Since events do not occur with equal frequency by units of time, the sampled events approximate to an unknown degree the "true" frequencies. Investigators try to reduce this error by sampling as frequently as possible.

The second method assumes that events are distributed equally across similar locales. The error in the observed sample of events is a function of the differences between events within different locales.

The third method assumes that the actions of a subset of persons represents the domain of events occurring in the larger collectivity. Amount of error is a function of the representativeness of the sample of persons observed.

No one of these assumptions is more tenuous than the others, if one has data on the domains being sampled. But the necessary information required to describe a sampling plan is not available for the first two methods. We do not have, for example, a continuous record of classroom events so that we can estimate how much bias is introduced by varying the length of an observation unit and the intervals between units. Nor do we know how events vary within similar locales in the classroom. Thus, samples of events which are produced by these two methods may be biased and it is impossible to estimate the bias.

The third method, however, requires only that we have information on the group to be observed, construct a sampling frame embodying this information, and then randomly sample within this frame individuals to be observed. Previous sections in this chapter described this sampling procedure for this study. APPLE observers are, therefore, providing a representative sample of pupil events.

Two other features of the APPLE system should be pointed out. The observation provides a continuous record, not a sample, of the instructional context and the teacher activity. Within instructional context and teacher activity, however, the observational method provides a representative sample of teacher actions or responses as they occur with respect to the target pupils. The assumption is made that by selecting pupils representative of the class in terms of specified characteristics, we sample representative teacher-pupil interaction dyads. This assumption is identical in character to that made about pupil events. But we do not know how this domain of teacher-pupil dyadic events varies as a function of the characteristics of pupils.

We have provided in Volume I, therefore, the rationale for the sampling matrix used. The logic of the rationale is that teacher-pupil interactions are more likely to vary as a function of pupil characteristics used. Even if empirical data showed that such dyads varied more as a function of other characteristics, this study still provides a representative sample of teacher-pupil interactions in the domain determined by variations in pupils' achievement and teachers' expectations.

Pupil events are sampled only in the sense that a representative sample of pupils is observed. Teacher actions are sampled only in the sense that the teacher's actions with respect to the representative sample of students is sampled. But it should be remembered that teacher actions described by instructional context and teacher activity are continuously recorded.

The other potential source of error in an observation system is observer error, the most important of which is failure to observe events. The training of observers is designed to reduce this error, as are the rules for observing. Simplifying forms and methods of recording are other ways of reducing the likelihood of such error.

The ordinary test of the amount of this error is made by placing two or more observers in a class, and then comparing their records to assess their agreement. As noted earlier, this procedure was used in this study and its results are reported in Appendix A.

Procedures for Observing Sampled Behavior

An enormous number of discrete, specific responses or actions, sounds, and movements occur in a classroom. No observer could record all of these, nor should he. The observer's task is to note and observe, among all these potential observables, those likely to be effective stimuli if they were noted or observed by a teacher or pupil. (An effective stimulus is one which evokes a response.) Since the purpose of this study is to find actions or responses which are effective stimuli, as few responses should be excluded as possible. The observers were instructed what not to miss, and when in doubt, to record.

The observers were given the Lexicon for Observation in Schools and were asked to read through it. The purpose of this reading was to familiarize the observers with the kinds of events that occur in class rooms. These are the kinds of events they were to record, though they were not limited to these types of events. The observers did not memorize the list. The goal was to get the "feel" of the range of events which they were likely to see and should record. The manual the observers used in the field contained a list of the names of the entries in the lexicon. The reader should understand that observers did not use these event names when recording in the field. The observers wrote literal descriptions of what they saw and heard.

Almost any behavior of the target pupil which was observed could be recorded, but we instructed observers to look especially for behaviors in the following areas: academic-intellectual, social-emotional, general response to learning, and physical appearance. (Refer to Table 3 for the entire set of pupil event names found in the lexicon.)

Each pupil behavior was accompanied by a description of the teacher response. The Stress of School Project results showed that only about one third of naturally observed pupil behavior is accompanied by an identifiable teacher response. We wanted all teacher responses to pupil behavior to be recorded for the BTES project. Therefore, we required observers to pay attention to non-verbal as well as to verbal interactions with pupils. Non-verbal responses, such as "smiles," "notices" (without a particular facial expression), "frowns" or "ignores" were to be recorded if the observer was certain of the expression and if the reactions were in response to the pupil event. (See Table 4 for the entire set of teacher response names in the lexicon.) For some pupil events, however, recording a teacher response was inappropriate. In these cases, the observer simply wrote "not applicable" or "none" or some other statement describing the absence of a teacher response in the space for the record of teacher response for the observation.

Encoding APPLE Observations

All of the observations were encoded in the University project office by three research assistants, each of whom had had considerable experience in this work. The main task in the encoding process is to assign a computer lexicon name to each mandatory entry. The first entry on the BTES APPLE Observation Form is "Pupil Code". The code the observer had entered was checked against the pupil code on the class list.

The computer name for "Event Name" was assigned by referring to the lexicon. The event name is a label which describes the behavior, incident or information recorded by the observer. The event name is a highly condensed source of information which allows for convenient computer manipulation of the anecdotal material. As the reader may have noted, the computer abbreviations for each item in the pupil event lexicon appeared with the descriptors in Table 3 of the previous section. The Lexicon for Observations in the Schools (Lambert and Hartsough, 1971; Lambert, Hartsough, Caffrey and Urbanski, 1976) was always at hand as the encoding process continued. It contains definitions, examples of usage, and sample observations collected from the Stress of School Project. The encoder made a decision about which term to use as a label for the particular observation by comparing the content of the anecdote to the definitions and examples of usage for the pupil event name or names which his coding experience suggested might apply. Most single observations required no more than one pupil event name to characterize the content of the occurrence noted by the observer. In general, pupil event names within the nine major categories of the pupil event lexicon (see Table 3) were mutually exclusive in their application. However, the sets of codes across categories were not necessarily treated as mutually exclusive items. If the content of the observation described more than one facet of the pupil's behavior, for example, "Pupil talks incessantly to her neighbors but completes her subtraction worksheet with no errors", then more than one pupil event name was assigned and each was counted as a separate tally in the compilation of frequencies of pupil event names. In the aforementioned example, the observation would be labeled both "-Talking" and "+Number Concepts". In general, however, most observations were written in such a way that only one pupil event name applied because only a single facet of the pupil's behavior was observable at the moment.

The next mandatory entry is "pupil activity".* All entries in this field were compared with the lexicon for pupil activities (Table 5) and the computer abbreviation entered into the appropriate space. The context field was to have been completed by the observer and the encoder simply checked to see if proper computer abbreviations were used. The lexicon names for "teacher activity" were compared with the English language descriptions and new entries were added to the teacher activity lexicon when necessary. The computer name for the teacher activity (Table 2) was entered next in the mandatory field. The final item of mandatory information was the "teacher response". The encoder compared the verbal descriptions with the lexicon (Table 4) and entered the computer name in the mandatory field.

When a set of observations had been encoded, each observation was defined by the computer abbreviations for pupil code, event name, pupil activity, instructional context, teacher activity and teacher response. All of this information was keypunched and became a line of computer information defining one pupil event.

The encoder also checked the Observer Summary Report against the Observation Forms for accuracy of the time entries for the different contexts. The number of minutes each pupil was judged to be productive in each context was computed from the information available on both forms. These data then were prepared for keypunching. They provide evidence of the time distribution of different instructional contexts for each observed pupil, as well as the estimated amount of productive time for each pupil in the observation periods for reading and mathematics instruction.

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*In the space captioned "Subject" on the Observation Form, the observer entered the name of the target pupil. The name was changed to a code number at the end of the observation day.

Preparation of APPLE Observations for Data Analysis

At the conclusion of the observation period, we had collected thousands of observed events and approximately 400 summary reports on the time distributions of reading and of mathematics instructional contexts in the BTES classrooms. As soon as the APPLE Observation Forms and the Observer Summary Reports were encoded, they were keypunched and ready for processing into the APPLE Information System. The computer programs arranged the observations, by date of observation, within each pupil's file. Pupil files were arranged by code number within classroom units. When the computer files were complete, they were ready for analysis by pupil characteristics. For the BTES project our concern was to summarize the observation data using the classroom as the unit of analysis in order to generate classroom variables for our study of teacher performance predictors of achievement and attitude outcomes. The preparation of these data using the classrooms as the unit of analyses required several steps.

Specification of the most frequently appearing observational data. Our first step in the data reduction was to have the computer make counts of the number of different types of pupil events, teacher activities, instructional contexts and teacher responses. The pupil activity information was used to sort the observations associated with reading and mathematics instruction. It must be noted that many of the BTES classrooms were not self-contained, and in still other classrooms several teachers integrated reading and mathematics instruction into single teaching sessions. The APPLE observations and computer programs made it possible to define the reading and mathematics observations on the basis of the actual learning activity of the pupil. (The pupil activities subsumed under the general instructional areas of reading and mathematics are listed in Table 5.)

We began the data reduction process by examining the raw frequency counts from the entire observation record which includes reading, mathematics and other observed activities. These counts are found on Tables 6, 7, 8 and 9. We then obtained counts of the most frequent pupil events associated with reading and mathematics activities, eliminating from this step all events not observed in those lessons. We followed the same procedure of making raw frequency counts for contexts, teacher activities, and teacher responses for reading and mathematics. At this point in our work, we had to establish arbitrarily a frequency cut-off point for inclusion of observation variables in the subsequent analyses. Our goal was to include the maximum number of variables and yet have observation measures which occurred with sufficient frequency to serve as meaningful measures of classroom differences. We decided to include any observation variable if its raw frequency in either reading or mathematics instructional activities was 100 or greater. The list of pupil events retained for the BTES analysis and their APPLE lexicon definitions are presented on Tables 10 and 11, followed by frequency counts and definitions for contexts (Tables 12 and 13), teacher activities (Tables 14 and 15), and teacher responses (Tables 16 and 17).

Transformation of raw observation frequencies into comparable measures across classrooms. Prior to consideration of appropriate procedures for transforming the observational data into measurement units which were comparable across all classrooms, we made a careful check of the representativeness of the target pupils. As described

Table 6

Frequency of Events Over All BTES Classrooms

Greater Than 100		Between 50-100	
Frequency	Event Name	Frequency	Event Name
3073	Engagement	91	Egress
1519	Work Habits	71	Scheduling
1320	Attentiveness	67	Enthusiasm
1097	Inattention	61	Responsibility
962	Academic Performance	58	Student Wish
889	Conduct	54	Restlessness
871	Direction Following	54	Sitting Behavior
849	Number Concepts	52	Distractibility
555	Talking	51	Ability
464	Oral Reading	51	Activities
453	Questioning		
369	Participation		
349	Volunteering		
186	Phonic Skill		
184	Speaking		
165	Cooperation		
157	Interests		
155	Reading Comprehension		
145	Wandering		
138	Social Relationships		
133	Pupil Help		
121	Vocabulary		
108	Disruptive Conduct		
106	Reading Vocabulary		

Table 7

Frequencies of Contexts Associated with Events Over All BTES Classrooms

Greater than 100		Between 50-100	
Frequency	Context	Frequency	Context
3972	I - Group	98	T - Individual
3930	T - Class	82	A - Individual
3008	T - Group		
2885	I - Class		
549	I - Individual		
474	Not Applicable		
322	A - Group		
280	Test		
269	Transitional		
148	A - Class		

Table 8

Frequencies of Teacher Activities Associated with Events Over All BTES Classrooms

Greater than 100		Between 50-100	
Frequency	Activity	Frequency	Activity
5066	Work with Group or Individual	92	Around
833	Asking	78	Directions to Class
801	Not Applicable	73	Out of Room
791	Checking	61	Socializing with Adult
783	Circulating	55	Collecting Materials
670	Helping		
568	Academic Organization		
482	Supervising		
449	Discussion		
433	Instruction Giving		
429	Question & Answer		
413	At Desk		
275	Explaining		
264	Listening		
236	Correcting		
225	Testing Group or Class		
214	Reading to Class or Group		
200	Dictating		
191	At Board		
178	Answering		
164	Lecturing		
154	Distributing to Class		
106	Non-Academic Organizing		

Table 9

Frequencies of Teacher Responses Associated with Events Over All BTES Classrooms

Greater than 100		Between 50-100	
Frequency	Response	Frequency	Response
10909	(None)	86	Permits
925	Not Applicable	69	Encouragement
894	Positive Feedback	67	Acceptance
513	Redirection	54	Negative Feedback
355	Recognizing		
353	Ignoring		
315	Help		
307	Praise		
255	Instructing		
209	Questioning		
135	Moves On		
126	Correcting		
125	Reprimanding		
124	Explaining		

Table 10

Raw Frequency Counts of Pupil Events in Reading and Mathematics Instruction

	Reading			Mathematics		
Events	Grade 2	Grade 5	Total	Grade 2	Grade 5	Total
+ Academic Performance	160	203	363	13	9	22
+ Attentiveness	143	191	334	102	171	273
+ Direction Following	82	77	159	47	56	103
+ Engagement	528	733	1261	257	523	780
+ Participation	78	43	121	36	28	64
+ Volunteering	56	66	122	56	54	110
+ Work Habits	156	143	299	143	183	326
- Conduct	56	44	100	29	41	70
- Inattention	145	179	324	95	177	272
- Talking	64	115	179	54	105	159
0 Conduct	70	69	139	32	51	83
0 Engagement	61	78	139	32	35	67
0 Inattention	54	57	111	26	47	73
0 Work Habits	79	110	189	61	115	176
+ Oral Reading	241	102	343			
+ Phonic Skills	85	61	146			
+ Reading Comprehension	58	55	113			
+ Number Concepts				293	280	573
- Number Concepts				85	66	151
0 Number Concepts				54	58	112

Table 11

APPLE Lexicon Definition of Selected Pupil Events

+ ACADEMIC PERFORMANCE:	Level of performance in school tasks; response to assignments or lessons. Correct.
+ ATTENTIVENESS:	Act of paying attention to the subject being taught or discussed, as shown through physical orientation, gestures, verbal response. Used only in positive sense and in situation where teacher is instructing or leading lesson.
+ DIRECTION-FOLLOWING:	Behavior related to following directions given by the teacher. Cooperation with teacher directives, whether academic or behavioral.
+ ENGAGEMENT:	Act of being involved in subject of lesson. Used when pupil working independently of teacher.
+ PARTICIPATION:	Description of an act of joining in a general class or group activity.
+ VOLUNTEERING:	Any spontaneous offering by the child to do a job or to give information, as in response to teacher's call for volunteers or to a question put to the entire group or class.
+ WORK HABITS:	Positive manner or method of pursuing tasks, i.e. completion of work, efficiency, organization, neatness.
- CONDUCT:	Negative school behavior which cannot be placed under a more specific event.
- INATTENTION:	Not paying attention to subject being taught or discussed, as shown through orientation, verbal responses, gestures. Usually implies a long-term distraction from activity being directed by teacher.
- TALKING:	Inappropriate or forbidden speaking, such as speaking out of turn or during a quiet period.
0 CONDUCT:	Neutral school behavior which cannot be placed under a more specific event.
0 ENGAGEMENT:	Act of being engaged in subject of lesson, but with less degree of involvement or attention than + ENGAGEMENT.

Table 11 (Cont.)

0 INATTENTION:	Not paying attention to subject being taught or discussed. Usually implies a short-term distraction from activity being directed by teacher.
0 WORK HABITS:	Neutral manner or method of pursuing tasks.
+ ORAL READING:	Positive quality of students reading out loud; fluency, accuracy, expressiveness, pacing, etc.
+ PHONIC SKILLS:	Positive evidence of skill in sounding out new words; knowing the sound connected with letters.
+ READING COMPREHENSION:	Pupil's correct understanding of what he has read.
+ NUMBER CONCEPTS:	Positive knowledge of numbers and number relationships. Includes identification of numerals, counting, skill with fractions, geometrical properties, etc.
- NUMBER CONCEPTS:	Absence of knowledge of numbers and number relationships, in comparison with age and class level.
0 NUMBER CONCEPTS:	Partial knowledge of numbers or number relationships (e.g. a concept partly understood) or absence of knowledge of concepts more advanced than required by age or class level.

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Table 12

Raw Frequency Counts of Contexts in
Reading and Mathematics Instruction

Contexts	Reading Grade 2	Grade 5	Total	Mathematics Grade 2	Grade 5	Total
Adult-Group	215	41	256	40	5	45
Independent-Class	256	537	793	286	856	1141
Independent-Group	895	1098	1993	471	611	1082
Independent-Individual	122	98	220	74	26	100
Teacher-Class	303	400	703	701	599	1300
Teacher-Group	1154	930	2084	233	358	591

Table 13

APPLE Lexicon Definition of Selected Contexts

ADULT-GROUP:	The class is divided into groups and an adult other than teacher is directing the activity of the group in which the child being observed is participating.
INDEPENDENT-CLASS:	The entire class is working or playing independently of the teacher's direction. Teacher usually present but not directing.
INDEPENDENT-GROUP:	The group of students in which the child being observed is participating is working or playing independently of the teacher's direction.
INDEPENDENT-INDIVIDUAL:	The student being observed is working or playing independently of the teacher's direction and also independently of the rest of the class.
TEACHER-CLASS:	Teacher is directing the activity and the entire class is participating.
TEACHER-GROUP:	The class is divided into groups and the teacher is directing the activity of the group in which the child being observed is participating.

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Table 14

Raw Frequency Counts of Teaching Activities in Reading and Mathematics Instruction

	Reading			Mathematics		
Teaching Activities	Grade 2	Grade 5	Total	Grade 2	Grade 5	Total
Academic Organizing	107	88	195	41	60	101
Answering	19	56	75	20	66	86
Asking	228	206	434	123	129	252
At Desk	11	148	159	8	181	189
At Board	46	22	68	88	51	139
Checking	85	133	218	163	197	360
Circulating	108	185	293	224	237	461
Discussion	42	137	179	15	24	39
Explaining	26	45	71	69	121	190
Helping	116	121	237	96	260	356
Instruction Giving	67	101	168	65	84	149
Listening	113	63	176	4	4	8
Question & Answer	43	218	261	37	59	96
Supervising	35	80	115	65	80	145
Working with Individual or Group	1677	1121	2798	606	632	1238

Table 15

APPLE Lexicon Definition of Selected Teacher Activities

ACADEMIC ORGANIZING:	Teacher getting class or group organized. Giving directions, explaining and doing other activities which direct the students into activities.
ANSWERING:	Teacher answers question(s). May refer to a single answer to a single question or to a general situation where teacher is answering questions put by several students over a period of time.
ASKING:	Teacher is asking questions of a single student, a group, or the class.
AT DESK:	Teacher is doing work at desk. Used when teacher's activity is unspecified or unknown and/or when she is available to help students at her desk.
AT BOARD:	Teacher is working at blackboard, either alone (e.g., writing on board) or with student(s).
CHECKING:	Teacher is checking work to see if material is understood, to see if instructions are being followed, to see how well work is being done, or if work is correct.
CIRCULATING:	Teacher is circulating around room, interacting with students, asking and answering questions, giving help. Used when a more specific activity cannot be identified or when several activities are happening one after the other, too quickly to be specific.
DISCUSSION:	Teacher is leading a discussion. Emphasis on student response and comprehension, not simply on facts.
EXPLAINING:	Teacher is explaining something, either in response to a question or as part of a process of giving instructions.
HELPING:	Teacher is helping a pupil or pupils in unspecified manner. Used when more precise activity, such as explaining or answering, cannot be distinguished, or when several helping activities are happening too quickly to be specified.
INSTRUCTION GIVING:	Teacher is giving instructions either about an assigned activity or about classroom organization.

Table 15 (Cont.)

LISTENING:	Teacher listens to a student, either during oral reading or while student speaks to her or asks a question.
QUESTION AND ANSWER:	Teacher is asking a series of questions, which students answer. Used primarily in group or class context and distinguished from ASKING by serial nature of questions.
SUPERVISING:	General situation where teacher is watching over class or a group. May occasionally ask or answer questions, but general emphasis is on observation rather than interaction with students.
WORKING WITH:	General unspecified instructional activity of working with an individual, a group or the class. Used when no other teaching activity is specified.

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Table 16

Raw Frequency Counts of Teacher Responses to Pupil Events in Reading and Mathematics Instruction

	Reading			Mathematics		
Teacher Responses	Grade 2	Grade 5	Total	Grade 2	Grade 5	Total
Instructing	132	98	230	68	91	159
Disciplining	51	34	85	28	30	58
Teacher Help	76	61	137	38	66	124
Ignoring	78	65	143	47	71	118
Moves On	44	43	87	11	12	23
Negative Feedback	19	7	26	8	10	18
None	1923	2131	4054	1250	1912	3162
Positive Feedback	262	245	507	126	119	245
Praise	89	73	162	51	33	84
Questioning	67	35	102	24	16	40
Recognizing	67	83	150	38	67	105
Redirecting	117	109	286	80	58	138

Table 17

APPLE Lexicon Definition of Selected Teacher Responses

INSTRUCTING:	Teacher activities connected with her traditional jobs of instructing and supervising the everyday business of the classroom - "gave a lesson," directed, organized, "called on pupil," answered a question.
DISCIPLINING:	Punishment imposed on child for his behavior, e.g. sent to principal's office or told to sit in corner or to stay after school.
TEACHER HELP:	Teacher gives some specific instructional assistance to an individual student.
IGNORING:	Teacher seemingly aware but not responding to behavior or performance of pupil.
MOVES ON:	Teacher does not comment on or give feedback to a pupil response, as in a question and answer session; instead, she calls on another pupil or moves on to another part of the lesson. Can occur when pupil's response is correct or incorrect.
NEGATIVE FEEDBACK:	Mild negative verbal reinforcement in response to academic or behavioral performance. e.g., "wrong," "no."
NONE:	No response to pupil performance or behavior. No distinction made between whether teacher aware of this performance or behavior or not (unless is clearly a situation of IGNORING).
POSITIVE FEEDBACK:	Use of mild positive verbal reinforcement in response to academic or behavioral performance. e.g., "right," "O.K.," "good," "fine," "correct."
PRAISE:	Teacher commends or tangibly rewards a student's activities or products.
QUESTIONING:	Teacher responds to pupil's behavior or answer to a previous question by herself asking a question.
RECOGNIZING:	Teacher's neutral nonevaluative response to an academic performance or a nonacademic behavior. e.g., "notices", "acknowledges".
REDIRECTING.	A verbal or non-verbal action by the teacher to redirect a pupil's behavior. Done without apparent anger.

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in a previous section, the target pupils were identified from the classroom rosters as being representative by sex, race, and achievement level. We reviewed the observation records for all observation days to determine if any factors operated which would limit the opportunity to observe all target pupils equally. Careful examination of this potential source of bias in the records revealed that the target population was consistently observed in all classrooms and that there were no selective factors operating which would invalidate the observational data as being representative of classroom characteristics.

Following an evaluation of the representativeness of target pupils, the next step in data reduction was to tackle the problem of differing frequencies of observations among classrooms resulting from variability in the number of observations (1, 2 or 4). First, we examined observation rates for different observers as a source of variability. As these were relatively uniform across observers, differences in frequencies of observation could then be attributed primarily to the "observability" of the activities of the classroom. This conclusion was supported consistently by informal observer reports. For example, in some structured classrooms the level of pupil activity was very low in comparison to a relatively unstructured classroom where pupils take responsibility for selecting their own learning activity. In the former case the instructional context in the classroom rarely changed. Consequently, the observer could make only continuous observations of "pupil reading silently in his reading book", or "pupil doing multiplication problems in his workbook". In the latter case the observer would make many observations since the context for the pupil might change five times during the mathematics instruction as the teacher introduced the mathematics lesson, the pupil completed an assignment, the pupil went to the demonstration table and worked on other tasks, and the pupil then returned to his desk to begin an independent free time assignment, after which the teacher brought the class back to attention and they prepared to go out to lunch.

Since we wished to obtain measures which would describe the classrooms in our sample fairly, a method of treating the raw observation frequencies had to be found which would equalize them for differential observation rates due to variability in the assigned number of observations in the classrooms and/or to differences in the extent of classroom structure. Our solution was to prorate the total frequency of each observation variable with respect to the total number of observations recorded overall (across all days of observation) for each teacher, after first separating the total record into subunits associated with reading and mathematics. Thus, in actual fact, the prorating factor was the total number of observations during either reading or mathematics since all observation variables were accumulated separately for these activities. These prorated frequency measures provided us with classroom variables which, we believe, can be considered independent, both of number of days of observations and of the possibly confounding classroom effects detailed above.

The reader should be apprised that the types of observation records obtained in the APPLE Observation System and processed by the APPLE computer programs provide a very rich source of information about pupils and teachers. The investigator has a wide variety of ways in which to look at the observational data. Our decision to elect these methods of data reduction was based on the objective of defining aspects of pupil and teacher behavior to serve as classroom performance measures and then of analyzing the predictive validity of each of them.

Reduction of Time Allocation Variables to Reflect Time Allocation by Classroom

The basic data for calculation of time allocation measures were taken from the Observer Summary Report which required the observer to record for each pupil a maximum of the three most frequent types of reading contexts (r_1, r_2, r_3) and the three most frequent types of mathematics contexts (m_1, m_2, m_3) in which the pupil had been observed during the specified observation period. Also reported for each pupil were the following:

A = Total number of minutes in each of three contexts for each pupil

B = Percent of total time devoted to each context for each pupil, e.g.

$$B_{r_1} = \frac{A_{r_1}}{A_{r_1} + A_{r_2} + A_{r_3}}$$

C = Total number of minutes in each context during which pupil was engaged in productive, student-like behavior

D = Percent of time in each context during which pupil was engaged in productive, student-like behavior, e.g.

$$D_{r_1} = \frac{C_{r_1}}{A_{r_1}} \qquad D_{r_2} = \frac{C_{r_1}}{A_{r_2}}$$

For two types of variables, the number of minutes and the percent of total observed time, scores for each teacher were obtained by averaging across observation days and across pupils in order to obtain two summary classroom measures, one reporting actual number of minutes (see Tables 26 and 32, pp. 83 and 90, for examples) and the other reporting the averaged proportion of the total time in the three contexts (see Tables 28 and 34, pp. 85 and 92, for examples). Averaging across observation days and across pupils was also done for the two additional variables, the number of productive minutes in each context and the proportion of the total productive time in contexts. This produced two more summary classroom measures, the average number of minutes or productive time (see Tables 27 and 33, pp. 84 and 91, for examples) and the average proportion of time which was productive in each context (see Tables 29 and 35, pp. 86 and 93, for examples).

In the review of the time allocation data, it became apparent that percent of time and percent of productive time measures would give only a partial picture of the total classroom instructional environment. If the amount of time the target pupil spent in each of his three primary contexts was not equivalent, or if all target pupils were assigned to the same contexts and spent different amounts of time in each, then it was felt that an additional method for computing the time allocation measures was needed. These supplementary measures provided another way to look at classroom productivity. In explaining these measures, let us first illustrate the case when the number of minutes in contexts is similar across pupils. Take the case of three target pupils each of whom spent approximately 10 minutes in Independent-Group contexts, but who manifested productive student-like behavior to differing degrees:

Total Time in Context	Total Productive Minutes	Percent Productive Minutes
T_1 = 10 minutes	0 minutes	0%
T_2 = 10 minutes	10 minutes	100%
T_3 = 10 minutes	5 minutes	50%
		Average Pupil Percent Productive = 50%
Total Gross Time = 30 minutes	Total Gross Productive Time = 15 minutes	Gross Percent Productive = 50%

The average percent of productive time would be: $\frac{0\% + 100\% + 50\%}{3} = 50\%$

The total time (gross number of minutes) in the Independent-Group context for the three target pupils was 30 minutes, the gross number of minutes of productive time was 15 minutes, and the percent of gross productive time was: $\frac{30 \text{ Minutes}}{15 \text{ minutes}} = 50\%$

In another case the time spent in the Independent-Group context varied among the target pupils. For example, consider the following case:

Total Time in Context	Total Productive Minutes	Percent Productive Minutes
T_1 = 5 minutes	5 minutes	100%
T_2 = 15 minutes	5 minutes	33%
T_3 = 25 minutes	5 minutes	20%
		Average Pupil Percent Productive = 51%
Total Gross Time = 45 minutes	Total Gross Productive Time = 15 minutes	Gross Percent Productive = 33%

When the percent of productive time was averaged across the three pupils, the average productive time for the classroom was 51%, almost the same degree of productivity as in the first classroom. In the first example the percent of gross time which was productive (number of productive minutes for all pupils divided by the total number of pupil minutes in the context) was also 50% -- the same value as we found when we averaged percent of productive time for the three pupils. In the second example the percent of gross time which was productive was only 33% while the average value across pupils was 51%.

A final illustration shows another way in which average percent pupil productive time and percent productive gross time can vary:

Total Time in Context	Total Productive Minutes	Percent Productive Minutes
T_1 = 5 minutes	1 minutes	20%
T_2 = 15 minutes	5 minutes	33%
T_3 = 25 minutes	25 minutes	100%
		Average Pupil Percent Productive = 51%
Total Gross Time = 45 minutes	Total Gross Productive Time = 31 minutes	Gross Percent Productive = 69%

In this third example, the gross percent productive time was greater (69%) than the average productive time across the target pupils (51%). We can see from these examples that when pupils are more productive in contexts that have a longer duration, the gross percent productive time in context will be greater than the average percent of productive pupil minutes.

The choice of which value most fairly measures the classroom instructional impact will require further evaluation. However, for clarity and completeness of data presentation, two additional types of and percent of gross productive time in context (the total number of minutes the target pupils were judged to be productive divided by the total number of minutes across all target pupils in that context.) (See Tables 30 and 31, pp. 87 and 88, for examples.)

At the conclusion of the data reduction phase we had the following data for each teacher available for analysis:

1) Prorated incidences of the major observational categories

  a) Pupil events
  b) Instructional contexts
  c) Teacher activities
  d) Teacher responses

2) Time allocation measures for instructional contexts

  a) Average number of minutes in each context
  b) Average proportion of total minutes in each context
  c) Average number of productive minutes in each context
  d) Average proportion productive minutes in each context
  e) Average proportion gross number of minutes in each context
  f) Average proportion gross productive minutes in each context

Results

The primary function of the analysis of the APPLE observational data for the Beginning Teacher Evaluation Study was to provide testable hypotheses about the classroom performances of teachers that are related to pupil growth in the academic areas of reading and mathematics. In order to reflect the interests of the Commission, we have systematically organized and analyzed the information to focus on teaching performances. Each teacher's pupils were treated as a group. Although individual teachers were the unit of analysis, the subset of students who had been selected to be observed represented a comprehensive range of pupil attributes. They were a representative "cross-section" of pupils in BTES classrooms.

In this section of the report, we will describe the major findings from the APPLE observational phase. These findings will include, by grade level, summary statistics which include descriptions of the average prorated frequencies of observation variables for reading and mathematics, as well as summary statistics for the time allocation in instructional context variables. (For a detailed report of these descriptive statistics compiled for BTES classrooms stratified by Socioeconomic Status and Geographic Location of School see Appendix B.) Also presented in this section are predictive validity studies of each of the APPLE variables using end of year achievement and attitude scores as the criteria, controlling for Fall test performance. Finally, we will present tables of crosstabulations and describe some of the relationships among teacher activities, teacher responses, teacher classroom organizational strategies, and pupil academic and attitudinal changes by comparing the classrooms where the pupil growth was greatest to those classrooms where the least growth was produced.

The findings to be reported below, with the exception of the crosstabulation tables, consist of statistics associated with each of the fifty incidence variables and sixty time allocation variables analyzed individually. When the APPLE variables are subsequently analyzed along with the other measures collected during the BTES study, it is expected that they will be subjected either to empirical data reduction or to rational combinatorial procedures. Such data reduction seems mandatory if the total number of variables is not to exceed the number of classrooms, the unit of analysis for the studies to be reported in Volume I. In an attempt to provide a framework within which such data reduction might proceed, we have conducted factor analyses within each of the major observational categories. Because of the technical nature of this material, the results of these analyses, by grade level and instructional area, are given in Appendix C. Also reported in Appendix C are validity studies of the relationship between factor scores derived from the analyses and the end of the year achievement and attitude outcomes, controlling for fall test scores.

Having thus chosen to analyze the APPLE data as individual variables rather than as grouped variables, we were faced with a large array of outcomes to be described. Confronted with this task, we have elected, in the following discussions of results, to comment on only those relationships which seemed to us especially noteworthy on either theoretical or practical grounds. The careful reader may note that some variables starred as significant may not be mentioned in the verbal description of the results. This is not an oversight but merely reflects our judgment about which findings were most worthy of elaborated discussion.

Some readers also may be concerned to find small variations in the numbers of teachers included for the different analyses to be reported below. Although ninety-five teachers were originally scheduled for observation, one teacher subsequently couldn't participate because of injuries received in an automobile accident. Accordingly, the incidence data reported in Tables 18 through 25 was based on N=94. Likewise, the tables of descriptive statistics for instructional context time allocation variables show N's which are different from the incidence variables and differ also between reading and mathematics. The loss of data for these analyses (N=90 for reading time allocation variables and N=84 for mathematics time allocation variables) is a consequence of two observer's initial confusion about the nature of the recording task for the "Observer Summary Report". Although APPLE project staff were in routine contact with observers, inevitable delays in receipt of completed observation materials made it impossible to rectify the misunderstanding until several days observations had been completed. Consequently, the total N available for analysis was reduced as indicated.

Grade Level Contrasts for Observations in Reading and Mathematics Instruction

Our first set of descriptive information summarizes the mean, median and standard deviation for each of the observation variables -- pupil events, instructional contexts, teacher activities and teacher responses. In nearly all cases the values for means and medians indicate that the distributions of classroom observations were not normal but were posi-

Table 18

Average Prorated Incidence of Events Observed
During Reading in BTES Classrooms

Events	Grade 2 N= 41			Grade 5 N= 53		
	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
+ Academic Performance	4.78	3.61	4.39	4.83	2.50	8.60
+ Attentiveness	4.72	3.15	4.73	6.12	4.08	7.41
+ Direction Following	2.29	1.25	3.14	2.57	.43	4.62
+ Engagement	16.36	14.38	10.31	24.98	24.05	14.94
+ Participation	2.18	1.70	2.51	2.01	.10	5.33
+ Volunteering	1.66	.93	2.05	1.86	.28	2.91
+ Work Habits	5.41	3.83	6.99	4.94	3.28	5.49
- Conduct	1.39	.24	2.39	1.38	.27	2.46
- Inattention	4.92	3.54	5.76	5.03	4.25	4.52
- Talking	2.52	1.30	3.38	3.10	1.78	3.58
0 Conduct	1.90	1.15	2.39	2.20	1.43	2.72
0 Engagement	2.51	.43	5.61	2.36	.18	4.22
0 Inattention	1.63	.48	2.67	2.38	.50	5.18
0 Work Habits	3.18	2.33	3.51	3.56	2.70	4.73
+ Oral Reading	6.05	5.05	5.10	2.94	1.30	3.52
+ Phonic Skill	2.36	.26	3.90	.94	.29	2.47
+ Reading Comprehension	2.41	.35	5.20	1.23	.31	2.17

Table 19

Average Prorated Incidence of Events Observed During Mathematics in BTES Classrooms

	Grade 2 N= 41			Grade 5 N= 53		
Events	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
+ Academic Performance	.74	.12	2.79	.32	.10	.93
+ Attentiveness	5.70	3.65	7.16	6.41	3.08	8.00
+ Direction Following	2.15	.21	4.66	1.68	.33	3.02
+ Engagement	11.96	10.00	11.31	19.25	16.70	14.30
+ Participation	2.36	.21	6.07	1.16	.14	2.20
+ Volunteering	2.15	.80	3.16	1.74	.31	2.29
+ Work Habits	7.57	7.05	8.37	5.79	4.38	5.61
- Conduct	1.19	.21	2.25	1.30	.17	2.43
- Inattention	4.30	2.60	5.15	5.60	4.53	5.57
- Talking	3.01	1.45	4.81	4.06	1.85	6.28
0 Conduct	1.61	.31	2.55	1.58	.28	2.54
0 Engagement	1.60	.29	3.25	1.16	.16	2.63
0 Inattention	1.63	.23	3.99	2.37	.34	4.92
0 Work Habits	3.15	1.38	4.13	5.05	3.30	6.85
+ Number Concepts	13.41	10.15	12.47	9.67	8.18	8.85
- Number Concepts	3.75	2.28	5.44	2.06	.27	3.32
0 Number Concepts	2.85	1.65	5.97	1.79	.34	2.54

tively skewed; that is, there was a piling up of frequencies at the lower end of the distribution. We believe that these distributions represent the actual distributions of the variables under the conditions of observation and that they are not artifacts of the procedure.

Comparisons of average prorated incidence of pupil events by grade level and instructional area. The average prorated incidences of pupil events observed in reading and mathematics instruction at the second and fifth grade levels are presented on Tables 18 and 19. It appears that pupil behavior at these grade levels in both reading and mathematics is very similar. There is more observable evidence of reading and mathematics skills in second than in fifth grade as evidenced by the higher rates of "+ Oral Reading" and "+ Number Concepts", as well as greater frequency of observations of "Phonic Skills", "Reading Comprehension", and neutral or negative evidence of number concept skills. "Plus (+) Engagement", the lexicon term which is assigned to pupil events of involvement with a lesson on which the pupil is working independently of the teacher, is more frequently observed in mathematics than in reading at both second and fifth grade levels. Negative pupil behaviors such as "- Conduct", "- Inattention", and "- Talking" are observed with similar frequency in both subject matter areas.

Comparisons of average prorated incidences of instructional contexts by grade level and instructional area. Reference to Tables 20 and 21 illustrates the great differences in the way instruction is organized for reading and mathematics at second and fifth grade levels. The context in which the teacher is teaching the whole class simultaneously is most frequent in the second grade for mathematics instruction, while "Independent-Class" (pupils working independently on the same assign-

Table 20

Average Prorated Incidence of Contexts Observed During Reading in BTES Classrooms

	Grade 2 N= 41			Grade 5 N= 53		
Contexts	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Adult-Group	7.46	.77	13.97	1.22	.10	4.39
Independent Class	7.28	.38	12.21	19.49	8.80	25.66
Independent Group	28.87	28.00	17.44	32.57	31.35	21.38
Independent Individual	5.08	.19	12.87	3.05	.16	9.63
Teacher Class	8.66	1.60	15.51	12.19	3.93	18.23
Teacher Group	32.54	33.68	18.86	24.63	22.08	22.02

Table 21

Average Prorated Incidence of Contexts Observed During Mathematics in BTES Classrooms

	Grade 2 N= 41			Grade 5 N= 53		
Contexts	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Adult Group	4.07	.31	12.18	.63	.32	4.57
Independent Class	13.06	1.48	19.97	27.11	16.50	30.37
Independent Group	22.41	21.20	20.00	22.49	15.85	24.81
Independent Individual	3.96	.39	11.05	.98	.07	4.23
Teacher Class	30.23	21.43	31.61	21.37	8.28	25.85
Teacher Group	14.04	.35	21.26	12.95	1.08	19.68

ment) is most freqjent for fifth grade mathematics. Teachers tend to rely more on whole class instruction and identical assignments for all pupils in mathematics than in reading. Some idea of the extent of individualized instruction can be inferred from the incidence of the "Independent-Individual" context. It was one of the least frequently observed classroom contexts at either grade level. There are a greater number of observations of this context in grade two than grade five and more in reading than in mathematics.

Except for the "Independent-Individual" context we can conclude that fifth graders are expected to spend more of their classroom time working independently of the teacher (in groups and as a whole class) in both reading and mathematics. Although it is relatively infrequent at either grade level, group instruction by an adult other than the teacher is more frequently observed in second grade classrooms in both reading and mathematics instruction. "Teacher-Group" instruction in reading is more common at second than fifth grade, but this context is equally frequent at both levels for mathematics instruction.

Comparisons of average prorated incidences of teacher activities by grade level and instructional areas. Tables 22 and 23 show central tendencies in teacher activities. Teachers at fifth grade are at their desk more often than are second grade teachers. There is a greater incidence of "Working With" at second grade, an activity reflecting instructional work with groups, individual pupils, or the entire class. Teachers are at the board more frequently in mathematics and more frequently in second grade. Teachers circulate and check pupil work and are observed helping pupils more frequently in mathematics than in reading at both grade levels.

Table 22

Average Prorated Incidence of Teacher Activities Observed During Reading in BTES Classrooms

	Grade 2 N= 41			Grade 5 N=53		
Activities	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Academic Organizing	3.05	1.90	3.96	2.49	.18	4.93
Answering	.66	.04	2.84	3.45	.33	10.84
Asking	6.46	4.35	8.47	4.78	2.33	5.78
At Desk	.40	.07	1.68	5.65	.20	14.21
At Board	1.58	.07	6.59	.89	.07	2.57
Checking	2.62	.14	4.86	4.85	1.05	9.97
Circulating	5.12	.14	16.20	7.21	.29	15.21
Discussion	1.73	.12	4.75	4.07	.26	8.87
Explaining	.48	.11	1.08	1.42	.10	3.90
Helping	3.64	.19	6.88	3.68	.45	6.62
Instruction Giving	2.30	.93	3.60	3.38	1.58	5.22
Listening	2.50	1.23	3.54	1.70	.33	3.78
Question & Answer	1.42	.13	2.77	4.16	.39	8.90
Supervising	1.50	.10	4.66	2.83	.28	6.93
Working With	46.58	50.90	26.96	31.75	27.20	25.08

Table 23

Average Prorated Incidence of Teacher Activities Observed During Mathematics in BTES Classrooms

	Grade 2 N= 41			Grade 5 N= 53		
Activities	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Academic Organizing	2.03	.31	3.77	1.65	.50	2.86
Answering	1.41	.08	6.10	2.83	.09	8.60
Asking	5.39	1.00	8.07	4.12	.27	6.72
At Desk	.45	.11	2.31	5.93	.22	14.59
At Board	4.86	.49	9.78	1.62	.16	3.10
Checking	6.69	1.41	11.45	6.98	2.06	11.89
Circulating	12.28	1.48	23.03	8.23	2.00	12.30
Discussion	2.40	.16	13.68	.71	.18	1.98
Explaining	2.10	.35	4.53	4.54	.54	11.02
Helping	5.13	.31	9.68	7.38	1.88	10.80
Instruction Giving	2.93	.95	4.40	3.25	.54	8.17
Listening	.16	.03	.72	.15	.07	.75
Question & Answer	1.51	.12	4.11	1.68	.17	5.05
Supervising	2.69	.39	5.35	2.52	.10	7.58
Working With	29.37	22.88	25.56	22.79	17.78	21.71

Comparisons of average prorated incidences of teacher responses by grade level and instructional areas. The quality of teacher responses to pupil events is very similar across both grade and instructional areas (Tables 24 and 25). About two-thirds of the time there is no teacher response to an observed pupil event. "Positive Feedback" and "Praise" are least observed in fifth grade mathematics, but occur with similar frequency for reading and mathematics instruction in second grade and for reading instruction at fifth grade. "Negative Feedback" and "Disciplining" are relatively rare. These findings, along with the relatively infrequent observations of "- Conduct" pupil events, lead to the inference that in organized instructional periods, conduct problems and disciplinary action by the teacher are not common.

Grade Level Comparisons of Time Allocation in Instructional Contexts in Reading and Mathematics

The types of time allocation data used to obtain measures of central tendency across all classrooms have been described previously. Briefly, they are: (1) the classroom average of the total number of minutes across target pupils for each of the three primary contexts reported for them; (2) the classroom average of the total number of minutes of productive time for target pupils in each context; (3) the average percent of minutes in each context for the target pupils; (4) the average percent of productive time for the target pupils; (5) the percent of gross time in each context (total number of minutes for all target pupils in each context divided by gross time over all contexts); and (6) the percent of gross time target pupils were productive (gross productive time in context divided by gross time in all contexts). See the Procedures section (pp. 62-66) for a complete explanation of the calculation of the measures.

When results are reported for two of these measures (the percent of productive time in context and the percent of gross productive time in context) only those classrooms in which pupils worked in the context were included in the calculations. In this way, classrooms in which a particular context was never observed would not be unfairly penalized by appearing to have no productive time in that context. For these two measures, we have indicated the actual number of classrooms in which pupils were observed in each context (see Tables 29 or 31, pp. 86 and pp. 88). In the remainder of the tables all of the classrooms at a particular grade level were included in the computation of the means, medians, and percent of time in contexts.

In general, time allocation measures (in terms of both the rank order of the number of minutes in context and the percent of time pupils spent in each context) should be congruent with the data reporting average prorated incidences of contexts associated with the pupil events. The time allocation data provide more precise measures of the ways in which the teachers organize their instruction, and the effectiveness and productivity of this instructional time for the target pupils. For example, we might expect that pupils would be less likely to be engaged in productive listening when the teacher was explaining something to the entire class and the context was Teacher-Class. On the other hand, when teachers were instructing a group of pupils, and the context was Teacher-Group, the productive time might be greater because the teacher could more easily observe the flagging attention of one of the group members and intervene appropriately. These time measures provide excellent

Table 24

Average Prorated Incidence of Teacher Responses Observed During Reading in BTES Classrooms

	Grade 2 N=41			Grade 5 N=53		
Responses	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Instructing	4.04	2.90	4.36	3.11	1.65	4.85
Disciplining	1.86	.20	3.35	.83	.09	1.71
Teacher Help	2.32	2.33	2.07	1.78	.66	2.49
Ignoring	2.04	.35	3.30	1.77	.18	3.03
Moves On	1.26	.24	2.14	.97	.09	1.67
Negative Feedback	.47	.10	1.34	.32	.03	1.33
None	62.12	63.78	17.35	66.13	68.38	19.00
Positive Feedback	7.05	6.70	5.93	6.01	4.28	7.02
Praise	3.15	1.58	3.81	2.14	.58	3.36
Questioning	2.46	1.73	3.35	1.04	.11	1.96
Recognizing	1.66	.83	2.00	2.80	1.65	3.89
Redirecting	3.47	3.25	3.27	3.08	2.28	3.79

Table 25

Average Prorated Incidence of Teacher Responses Observed During Mathematics in BTES Classrooms

	Grade 2 N=41			Grade 5 N=53		
Responses	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Instructing	3.86	2.09	4.85	3.26	2.08	3.95
Disciplining	1.42	.29	2.48	1.14	.18	2.13
Teacher Help	3.34	2.38	3.70	2.54	.60	3.59
Ignoring	2.42	.31	3.57	2.79	1.33	4.17
Moves On	.34	.12	.79	.45	.08	1.16
Negative Feedback	.28	.08	.85	.40	.08	1.03
None	65.18	66.35	16.56	67.90	73.45	21.28
Positive Feedback	6.20	4.00	7.62	3.71	1.88	4.77
Praise	2.35	.48	3.83	1.22	.26	2.26
Questioning	1.66	.26	5.61	.55	.15	1.25
Recognizing	2.41	.31	3.78	2.94	1.80	5.13
Redirecting	3.34	2.58	3.85	1.91	1.05	2.42

additional data from which to describe organizational factors in instruction by curriculum area and grade level.

Grade level comparisons for the six time allocation measures in reading. As Tables 26 and 27 indicate, more minutes are spent in small group instruction at second grade than at fifth. Teachers or other adults spend more time with individual pupils at second grade than at fifth and the younger children also spend more time on assignments on which they work independently of the teacher and of the rest of the class (I-Individual). On the average, second graders spend approximately 72 percent (Table 28) of their reading time in some type of group instructional activity (T-Group, I-Group and A-Group). Fifth graders on the other hand are in group instruction during reading approximately 54 percent of the time. While fifth graders were observed to be more productive on the average than second graders (Table 29) in general class instructional activities (T-Class and I-Class), fifth graders were as productive in the group instructional contexts as they were in instruction with the entire class participating. The average percent across pupils for productive time in the T-Class and I-Class contexts varied from 45% (I-Class for second grade) to 63% (T-Class for fifth grade). The average percent of productive time in group contexts varied from 53% (I-Group at second grade) to 63% (I-Group at fifth grade). A most surprising finding was that the proportion of productive time in the individual contexts in reading was relatively small. Since a small amount of pupil time is spent in these contexts, as the tables reporting number of minutes illustrate, we conclude that few pupils have the benefit of one-to-one interaction with the teacher (Teacher-Individual) or individualized instruction (Independent-Individual). On the other

Table 26

Mean Number of Minutes Per Student Per Day Spent in Contexts During Reading

	Grade 2 N=40			Grade 5 N=50		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	6.80	.27	0- 65.00	7.36	1.09	0- 80.00
I-Class	3.63	.17	0- 25.00	11.84	6.50	0- 65.00
T-Group	17.00	15.00	0- 55.00	11.08	9.50	0- 40.00
I-Group	23.08	19.00	0- 77.00	19.66	16.00	0- 60.00
T-Individual	.30	.07	0- 4.00	.06	.02	0- 2.00
I-Individual	7.08	.54	0-107.00	3.30	.25	0- 39.00
A-Class	.00	.00		.00	.00	
A-Group	5.03	.33	0- 29.00	1.20	.29	0- 31.00
A-Individual	.38	.11	0- 4.00	.02	.01	0- 1.00
Test	.30	.13	0- 7.00	.36	.18	0- 18.00

Table 27

Mean Number of Productive Minutes Per Student Per Day Spent in Contexts During Reading

	Grade 2 N=40			Grade 5 N=50		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	5.83	.24	0-64.00	6.22	1.00	0-76.00
I-Class	2.68	.50	0-23.00	8.30	2.50	0-53.00
T-Group	13.00	12.75	0-30.00	9.26	7.00	0-40.00
I-Group	16.23	13.70	0-51.00	14.60	11.25	0-48.00
T-Individual	.25	.07	0- 3.00	.04	.02	0- 2.00
I-Individual	5.23	.24	0-74.00	2.32	.11	0-27.00
A-Class	.00	.00		.00	.00	
A-Group	4.00	.33	0-25.00	.98	.19	0-26.00
A-Individual	.30	.11	0- 2.00	.02	.01	0- 1.00
Test	.18	.03	0- 6.00	.30	.15	0-15.00

Table 28

Mean Percent Total Minutes Per Student
Per Day Spent in Contexts During Reading

	Grade 2 N=40			Grade 5 N=50		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	11.28	.54	0-100.00	10.70	1.81	0- 80.00
I-Class	4.93	.33	0- 43.00	26.22	10.00	0-100.00
T-Group	29.10	26.50	0-100.00	18.84	18.00	0- 67.00
I-Group	34.40	32.50	0- 74.00	34.36	35.00	0- 95.00
T-Individual	.50	.09	0- 7.00	.18	.04	0- 7.00
I-Individual	8.33	.30	0- 83.00	6.04	.75	0- 63.00
A-Class	.00	.00		.00	.00	
A-Group	8.98	1.11	0- 47.00	1.90	.93	0- 33.00
A-Individual	.80	.21	0- 7.00	.06	.03	0- 3.00
Test	.45	.04	0- 11.00	1.00	.51	0- 50.00

Table 29

Mean Percent Productive Minutes Per Student Per Day Spent in Contexts During Reading

	Grade 2 N=40				Grade 5 N=50			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	53.15	48.25	8- 97.00	13	62.95	61.50	9-100.00	20
I-Class	45.10	38.00	1- 95.00	10	51.39	46.50	5-100.00	28
T-Group	56.36	58.50	4-100.00	36	55.62	53.50	9-100.00	34
I-Group	53.40	57.75	2- 89.00	35	62.56	70.25	17- 96.00	34
T-Individual	16.80	16.75	8- 25.00	5	14.00	14.00	3- 25.00	2
I-Individual	31.50	24.00	5- 77.00	12	36.22	28.75	7- 82.00	9
A-Class				0				0
A-Group	33.53	31.25	7- 85.00	15	40.00	40.50	28- 50.00	3
A-Individual	14.88	15.50	4- 25.00	8	8.00	8.00		1
Test	10.00	8.50	2- 24.00	3	44.00	44.00		1

Table 30

Mean Percent Gross Time Per Student Per Day
Spent in Contexts During Reading

	Grade 2 N=40			Grade 5 N=50		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	10.52	.27	0-100.00	10.72	2.17	0- 80.00
I-Class	5.55	.17	0- 44.00	25.66	12.50	0-100.00
T-Group	27.35	25.50	0-100.00	19.00	20.00	0- 67.00
I-Group	36.20	35.00	0- 74.00	35.44	36.50	0- 95.00
T-Individual	.55	.09	0- 7.00	.16	.02	0- 7.00
I-Individual	9.08	.30	0- 89.00	6.14	.63	0- 67.00
A-Class	.00	.00		.00	.00	
A-Group	9.30	.37	0- 49.00	1.98	.96	0- 36.00
A-Individual	.93	.32	0- 7.00	.04	.02	0- 2.00
Test	.63	.21	0- 17.00	.88	.45	0- 44.00

Table 31

Mean Percent Gross Productive Time Per Student Per Day Spent in Context During Reading

	Grade 2 N=40				Grade 5 N=50			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	88.31	90.75	72-100.00	13	86.40	90.17	63-100.00	20
I-Class	73.60	86.00	3-100.00	10	69.46	75.50	10-100.00	28
T-Group	80.83	89.00	9-100.00	36	85.62	90.17	35-100.00	34
I-Group	72.06	76.25	12-100.00	35	75.21	76.50	50- 95.00	34
T-Individual	90.00	93.75	50-100.00	5	75.00	75.00	50-100.00	2
I-Individual	77.67	80.00	50-100.00	12	82.67	87.00	63-100.00	9
A-Class				0				0
A-Group	78.60	81.00	41- 98.00	15	79.67	80.50	71- 85.00	3
A-Individual	91.25	95.83	55-100.00	8	71.00	71.00		1
Test	44.00	41.25	12- 87.00	3	86.00	86.00		1

hand we would expect that when time was allocated to individual or independent assignments, the time would be more productive since the pupils would be receiving either maximum attention from the teacher or using materials of special interest. The data on productive reading time in these contexts does not support such assumptions when productive time is averaged across pupils. When the gross percent of productive time is computed (Table 31), the values vary from 78% to 83% productive in the Independent-Individual contexts. We suspect that the range of percents of productivity reflect the fact that the Independent-Individual assignments may be a type of classroom management some teachers use with pupils who cannot otherwise work in a group or on a common classroom assignment. Those classrooms where the proportion of productive time in this context was high were presumably those where individually-planned, individualized instruction was provided to pupils who could sustain their attention to the task for long periods of time without frequent supervision from their teacher.

Grade level comparisons for the six time allocation variables in mathematics. Teacher instruction of the entire class is the context in which most time was spent in second grade mathematics (Table 32). In fifth grade, equal amounts of time were allotted to contexts in which the teacher was directing the work of the entire class or in which pupils were working independently on a common assignment. The amount of time spent in Teacher-Group contexts was similar at both grade levels, so that the primary difference in time allocation in mathematics between grades is in the relatively greater emphasis on the Teacher-Class contexts at second grade (Tables 34 and 36). The average proportion of pupil productive time in context (Table 35) is higher in Teacher-Class instruction than in any of the other contexts. However, when productive

Table 32

Mean Number of Minutes Per Student Per Day
Spent in Contexts During Mathematics

	Grade 2 N=38			Grade 5 N=46		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	14.66	12.00	0-50.00	13.49	10.06	0-50.00
I-Class	5.92	.41	0-28.00	14.60	13.25	0-58.00
T-Group	5.79	.83	0-33.00	5.86	.44	0-27.00
I-Group	7.90	4.50	0-34.00	11.11	6.50	0-52.00
T-Individual	.00	.00		.02	.01	0- 1.00
I-Individual	1.90	.11	0-30.00	.69	.10	0-17.00
A-Class	.00	.00		1.36	.49	0-40.00
A-Group	.92	.27	0-10.00	.04	.02	0- 1.00
A-Individual	.18	.06	0- 3.00	.04	.02	0- 1.00
Test	.24	.12	0- 9.00	.78	.09	0- 8.00

Table 33

Mean Number of Productive Minutes Per Student Per Day Spent in Contexts During Mathematics

	Grade 2 N=38			Grade 5 N=46		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	11.55	10.00	0-41.00	10.42	7.67	0-33.00
I-Class	4.11	.36	0-24.00	10.09	9.75	0-40.00
T-Group	4.82	.83	0-29.00	4.44	.37	0-21.00
I-Group	5.84	3.50	0-27.00	8.42	5.63	0-45.00
T-Individual	.00	.00		.00	.00	
I-Individual	1.53	.11	0-24.00	.36	.07	0-13.00
A-Class	.00	.00		1.00	.33	0-31.00
A-Group	.66	.19	0-10.00	.04	.02	0- 1.00
A-Individual	.08	.04	0- 1.00	.04	.02	0- 1.00
Test	.24	.12	0- 9.00	.69	.09	0- 8.00

Table 34

Mean Percent Total Minutes Per Student Per Day Spent in Contexts During Mathematics

	Grade 2 N=38			Grade 5 N=46		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	40.42	33.25	0-100.00	27.33	21.25	0-100.00
I-Class	13.53	.81	0- 68.00	31.09	31.75	0-100.00
T-Group	15.11	2.75	0-100.00	11.98	.88	0- 59.00
I-Group	21.74	11.50	0- 74.00	22.13	14.75	0- 82.00
T-Individual	.29	.03	0- 10.00	.02	.01	0- 1.00
I-Individual	3.92	.34	0- 48.00	2.09	.20	0- 50.00
A-Class	.00	.00		2.49	.91	0- 73.00
A-Group	2.66	.53	0- 34.00	.07	.02	0- 2.00
A-Individual	.45	.08	0- 5.00	.11	.02	0- 4.00
Test	.79	.41	0- 30.00	2.16	.18	0- 40.00

Table 35

Mean Percent Productive Minutes Per Student Per Day Spent in Contexts During Mathematics

	Grade 2				Grade 5			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	65.93	68.75	15-95.00	10	67.07	70.75	13 100.00	29
I-Class	49.94	45.50	6-95.00	16	58.71	57.00	10- 97.00	28
T-Group	41.95	27.25	3-88.00	19	46.75	44.50	3- 93.00	20
I-Group	44.05	43.00	7-87.00	22	47.89	48.00	8- 87.00	28
T-Individual	17.00	17.00		1	3.50	3.50	1- 6.00	2
I-Individual	20.86	18.25	4-40.00	7	17.67	16.50	1- 39.00	3
A-Class				0	62.50	62.50	47- 78.00	2
A-Group	21.83	16.00	8-50.00	6	13.00	13.00	4- 22.00	2
A-Individual	9.75	9.75	8-11.00	4	6.00	6.00	4- 8.00	2
Test	42.00	42.00		1	30.43	28.00	11- 50.00	7

Table 36

Mean Percent Gross Time Per Student Per Day Spent In Contexts During Mathematics

	Grade 2 N=38			Grade 5 N=46		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	39.71	30.50	0-100.00	27.69	21.25	0-100.00
I-Class	14.47	.81	0- 69.00	31.80	26.00	0-100.00
T-Group	14.81	2.00	0-100.00	12.22	.88	0- 65.00
I-Group	21.90	13.50	0- 74.00	22.20	13.75	0- 74.00
T-Individual	.05	.03	0- 1.00	.04	.02	0- 1.00
I-Individual	4.97	.34	0- 49.00	1.69	.20	0- 36.00
A-Class	.00	.00		2.33	.74	0- 73.00
A-Group	3.05	.53	0- 33.00	.07	.02	0- 2.00
A-Individual	.50	.08	0- 7.00	.09	.05	0- 2.00
Test	.66	.34	0- 25.00	1.91	.18	1- 26.00

Table 37

Mean Percent Gross Productive Time Per Student
Per Day Spent in Contexts During Mathematics

	Grade 2				Grade 5			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	79.26	81.83	55- 99.00	27	79.17	80.17	52-100.00	29
I-Class	73.06	71.50	33-100.00	16	73.68	77.00	30-100.00	28
T-Group	83.79	92.75	36.100.00	19	81.45	87.00	50-100.00	20
I-Group	74.55	79.50	30-100.00	22	76.14	77.50	36-100.00	28
T-Individual	100.00	100.00		1	60.00	60.00	20-100.00	2
I-Individual	81.57	80.50	67-100.00	7	43.33	42.00	14- 78.00	3
A-Class				0	73.00	73.00	68- 78.00	2
A-Group	92.50	95.00	75-100.00	6	73.50	73.50	67- 80.00	2
A-Individual	85.25	92.00	57-100.00	4	72.50	72.50	70- 75.00	2
Test	100.00	100.00		1	90.86	93.63	76-100.00	7

time in contexts was computed using gross time (Table 37), the Teacher-Group mathematics contexts were more productive. Pupils were in Independent-Individual contexts and contexts where an adult other than the teacher was in charge of instruction in only eleven second grade classrooms. While the average productive pupil time in these contexts was lower than in other contexts, the percent of productive gross time was high. If the observer judgments of productivity are accurate, time spent in Independent-Individual, Teacher-Individual, Adult-Individual and Adult-Group contexts on the average is not generally productive time in mathematics. However, when gross time is considered, the productivity rate for the classroom overall is as high in the individual context as in other settings. Such a finding suggests that only the small number of pupils who can tolerate rather long periods of time working independently are the ones who are judged to be doing productive work.

Partial Correlations of Observation Variables With Reading Achievement Outcomes

Five outcome measures defined the criteria which were available to evaluate the validity of the APPLE observation variables. One of these measures was a nationally standardized achievement test, the California Achievement Test in Reading Comprehension. Three other measures of reading achievement were developed as part of the Phase II BTES Pupil Test Battery. They were tests in reading achievement, reading application, and decoding. The fifth measure was an overall score combining the score from the California Achievement Test and the three project developed measures. Additional information about these measures and their psychometric properties is presented in Volumes II and IV.

We used a partial correlation of the observation variables with the end of year measure controlling for the fall test score, as the validity statistic. In common with most other observation systems

APPLE produces variables which are typically assymetrical and contain relatively few class intervals. In such situations the correlation coefficient is limited in the values it can assume. However, since no other analytical method seemed as suited to our needs, we hoped to insure that all potentially valid measures be included for further study by employing a less conservative probability level for ascertaining statistical significance than is conventional. Accordingly, we accepted a probability level of .10 or less that the partial correlations differed significantly from zero.

Partial correlations of prorated incidences of pupil events with reading outcomes. Several pupil characteristics were significantly related to achievement outcomes (Table 38). The greater the frequency of talking out inappropriately in class ("- Talking") the poorer the average achievement of that class in four of the five achievement measures in grade two. At the second grade level, observations of pupil behavior which were neutral with respect to "Engagement" and "Conduct" were negatively correlated to many outcome measures. These results suggest an inverse relationship between the end-of-year achievement outcomes and the observed frequency of pupil behavior which was perhaps not consistent with teacher ideas of ideal behavior, but not necessarily serious enough to warrant teacher intervention.

At second grade, more frequent evidence of positive achievement in phonics ("+ Phonic Skills") was positively correlated with reading achievement over two achievement tests, while the observation of achievement in phonics was negatively correlated with outcomes at fifth grade. We can offer the tentative interpretation that the more pupils are observed to be working on phonics activities in second grade, the better the chances that their scores in reading application and decoding will

Table 38

Partial Correlation of BTES APPLE Variables (Pupil Events) with Spring Outcome Scores Controlling for Fall Scores - Reading Tests

	CAT Reading Comprehension		Reading Application		Decoding Total		Reading Achievement		Total Academic Reading	
	2	5	2	5	2	5	2	5	2	5
+Academic Performance	.00	.22*	-.05	.06	-.10	-.21*	-.23*	.08	-.20	.12
+Attentiveness	-.19	.27*	-.11	.18	.01	.09	-.03	.21*	-.08	.28*
+Direction Following	-.04	.11	-.09	-.18	.03	-.12	-.13	-.12	-.12	-.11
+Engagement	.18	-.14	.16	.17	.08	.24*	.15	.07	.25*	.08
+Participation	.13	.11	.18	-.39*	-.26*	-.28*	-.20	-.21	.07	-.35*
+Volunteering	-.06	.08	.04	-.03	.14	-.19*	.17	-.04	.00	.05
+Work Habits	.09	.09	.10	.15	.27*	-.02	.07	.13	.07	.10
-Conduct	-.25*	-.21*	.09	-.05	-.20	-.10	-.09	.02	-.07	.01
-Inattention	-.04	-.02	-.12	-.26*	-.12	-.15	-.16	.01	-.09	-.18
-Talking	-.29*	-.04	-.43*	-.05	-.04	-.05	-.31*	.03	-.42*	.06
0 Conduct	-.33*	.06	-.23*	.14	-.28*	.02	-.22*	.14	-.31*	.18
0 Engagement	-.01	-.14	-.12	.14	-.29*	.08	-.23*	-.07	-.12	.01
0 Inattention	.23*	.10	.48*	-.30*	.12	-.02	.44*	-.04	.57*	-.29*
0 Work Habits	-.13	-.13	-.22*	.23*	-.19	.09	-.14	-.10	-.22	.12
+Oral Reading	.13	.20*	-.06	.10	-.00	.20*	.14	.11	.06	.20*
+Phonic Skills	.11	-.16	.31*	-.19*	.36*	.02	.08	-.02	.13	-.19*
+Reading Comprehension	-.05	-.06	-.02	.03	.17	-.17	.01	-.12	-.04	-.08

* p < .10

improve significantly at the end of the year. However, observations of pupil activities in phonics at fifth grade suggest pupils who do not have word attack skills are those who are experiencing reading difficulties.

"Oral Reading", while a common occurrence at second grade, is not significantly related to end of year second grade achievement. In fifth grade, where opportunities for oral reading are not as common, the frequency of observed oral reading of the target pupils was significantly and positively related to reading achievement.

Of some interest, because it violates conventional wisdom, is the finding that "+ Participation" was negatively related to application and decoding outcomes in second grade and decoding and total reading in fifth grade. In reading, "+ Participation" was most commonly used to label those observations indicating that the pupil was joining in appropriately as a member of a teacher led reading group. It then appears that teacher led groups as a classroom organizational strategy may not be the most productive of pupil growth in the reading skills tested by the application and decoding tests. The results of the subsequent analyses address this issue more directly.

Partial correlations of prorated incidences of instructional contexts with reading outcomes. Several context variables (Table 39) were significantly related to reading achievement outcomes. However, only a brief description of the nature and direction of the relationships will be offered here. It is important to note that the use of these context variables in isolation of teacher or pupil behavior obscures the potential relationship between management and instructional skills of teachers and their impact on behavior and learning. Especially, as compared to the results for the context time allocation variables, the context

Table 39

Partial Correlations of BTES APPLE Variables (Instructional Contexts) with Spring Outcome Scores Controlling for Fall Outcome Scores - Reading Tests

	CAT Reading Comprehension		Reading Application		Decoding Total		Reading Achievement		Total Academic Reading	
	2	5	2	5	2	5	2	5	2	5
Adult-Group	-.04	.12	.17	.02	-.12	.17	.06	-.20*	.16	-.01
Independent-Class	-.18	-.17	-.15	.03	-.04	-.05	.00	.33*	-.14	.03
Independent-Group	-.01	-.11	-.07	.10	-.20	.28*	-.33*	-.14	-.12	.08
Independent-Individual	.27*	.05	-.07	.03	-.03	-.05	.16	.10	.06	.06
Teacher-Class	.04	.13	.05	-.09	.36*	-.36*	.08	.01	.03	-.07
Teacher-Group	.22*	.14	.09	-.04	-.17	.10	.04	-.09	.07	-.02

* p ≤ .10

incidence variables represent a much "grosser" cut of the available data. Since a careful analysis of the relationship between the time in context measures and achievement will be reported later in this section, the results to be discussed here are abbreviated in comparison to those which will follow.

Thus, we found that "Teacher-Group" and "Independent-Individual" contexts correlate significantly with the California Achievement Test in grade two. "Independent-Group" and "Independent-Class" contexts are positively correlated at a significant level with the decoding and reading achievement measures respectively in grade five. On the other hand, the frequency of the "Independent-Group" context at second grade is negatively related to the reading achievement measure.

Partial correlations of prorated incidences of teacher activities with reading outcomes. It is of considerable interest that teacher activities which involve verbal behavior in the organization and introduction of lessons are negatively correlated with achievement outcomes (Table 40). "Academic Organizing", "Asking" questions, "Discussion", and "Instruction Giving" are all significantly and negatively correlated with the Reading Comprehension Test of the California Achievement Tests in second grade. "Academic Organizing" and "Instruction Giving" are inversely related to total reading achievement also at the second grade level. "Supervising" pupils, a type of non-interactive activity, is also negatively correlated at a significant level with three of the five achievement measures. The only teaching activity with uniformly positive correlations with reading outcomes is "Checking". From these results we can offer the tentative hypothesis that the more the teacher is involved in organizing the class for instruction, and the less the teacher is involved in checking to see if pupils are understanding their work, the poorer the end of year reading. This hypothesis is an interesting one since it is the verbal behavior of teachers which is often the object of supervisors' evaluation of classroom functioning.

Partial correlations of prorated incidences of teacher responses with reading outcomes. While the incidence of teacher "Instruction Giving" activities is negatively correlated with outcome (Table 40), the incidence of teachers' responses to pupil behavior by "Instructing" is positively correlated with second grade reading (Table 41). This intervention can be understood as a nonjudgmental response in which the teacher repeats the task or shows the pupil how to do something. While "Redirecting" a pupil whose behavior is perceived to be inappropriate is also a rather neutral teacher response, the greater the frequency of these responses the less likely the achievement will be as high in spring as would have been predicted by the fall scores. We infer that classrooms in which there is more need for teacher intervention of this type are those in which pupils are working less productively. Evidence of "Positive Feedback" and "Praise" to pupils is positively correlated with second grade reading performance. "Positive Feedback", on the other hand, was negatively correlated with the ETS reading achievement test at fifth grade. The response "Moves On", used when the teacher failed to acknowledge a pupil behavior, is negatively correlated with achievement at both grade levels. The "Moves On" response is one in which the teacher responds to pupil behavior by calling on another pupil or moving on to another part of the lesson. The more this occurs during reading lessons, the more likely it is that reading achievement at the end of the year will be lower than expected.

Table 40

Partial Correlations of BTES APPLE Variables (Teacher Activities) with Spring Outcome Scores Controlling for Fall Scores - Reading Tests

	CAT Reading Comprehension		Reading Application		Decoding Total		Reading Achievement		Total Academic Reading	
	2	5	2	5	2	5	2	5	2	5
Academic Organizing	-.26*	.03	-.24*	-.07	.14	.06	-.07	-.06	-.26*	-.05
Answering	-.07	-.26*	-.17	-.00	.10	.06	-.19	.27*	-.15	-.04
Asking	-.27*	.15	-.03	.10	.24*	-.09	.07	-.05	-.11	.11
At Desk	-.07	.05	-.11	.04	.04	-.18	-.06	.26*	-.12	.07
At Board	-.01	-.02	-.20	-.05	.31*	-.05	-.08	-.01	-.14	-.10
Checking	.20	.00	.28*	.10	.02	.07	.45*	.22*	.35*	.08
Circulating	.11	-.15	-.10	.07	.05	.04	.20	-.29*	-.02	-.07
Discussion	-.31*	-.01	-.05	.02	-.00	.10	.01	.03	-.12	.01
Explaining	.01	.13	-.08	.27*	.13	.08	.03	.03	-.02	.13
Helping	-.20	-.15	.03	.11	-.15	-.07	.11	-.01	.01	.07
Instruction Giving	-.44*	.02	-.17	-.22*	-.07	-.19*	-.15	.01	-.24*	-.18
Listening	.10	.09	-.17	.05	-.08	-.04	.04	.16	-.02	.09
Question and Answering	.12	.08	-.03	-.26*	.14	-.05	.06	.14	-.01	-.10
Supervising	-.10	-.02	-.36*	.08	.04	.02	-.27*	-.04	-.31*	.02
Working With	.21	.08	.15	-.05	-.13	.20*	-.15	-.16	.08	.05

* p ≤ .10

Table 41

Partial Correlations of BTES APPLE Variables (Teacher Responses) with Spring Outcome Scores Controlling for Fall Scores - Reading Tests

	CAT Reading Comprehension		Reading Application		Decoding Total		Reading Achievement		Total Academic Reading	
	2	5	2	5	2	5	2	5	2	5
Instructing	.17	-.11	.28*	-.07	-.14	.04	.15	-.10	.27*	-.12
Disciplining	.01	.00	-.15	-.09	.12	.02	-.25*	.18*	-.12	.00
Teacher Help	-.03	-.15	-.20	.11	.07	.06	-.12	-.07	-.22*	.16
Ignoring	-.08	.19*	-.14	.03	-.02	-.03	.11	-.09	-.10	.03
Moves On	-.37*	.07	-.04	-.20*	.02	-.19*	.05	-.11	-.14	-.16
Negative Feedback	.13	-.01	.13	-.08	.15	.06	.03	-.12	.06	-.10
None	.00	.10	-.04	.06	-.07	.07	-.06	.16	.06	.10
Positive Feedback	.27*	.16	.28*	-.12	.23*	-.14	.23*	-.19*	.19	-.07
Praise	.21*	.07	-.05	-.01	.28*	.07	.05	.11	.05	-.02
Questioning	-.16	-.21*	-.07	.06	.10	.12	-.00	-.06	-.10	.12
Recognizing	-.13	-.08	-.05	-.02	.01	-.19*	-.00	-.15	-.10	.00
Redirecting	-.25*	-.06	-.18	-.18	-.09	-.10	-.11	-.06	-.26*	-.14

* $p \leq .10$

Again it should be noted that considering the relationship of teacher responses to pupil outcomes in isolation of their interaction with instructional contexts, teaching activities, and pupil behavior gives an incomplete picture of the "true" nature of the relationships among the variables. Perhaps some of the reversals in direction of the relationships across grade level for certain responses (e.g. "Positive Feedback") are a consequence of differing patterns of instructional contexts and teaching activities across grade levels.

Partial Correlations of Observation Variables with Mathematics Achievement Outcomes

Two nationally standardized mathematics achievements tests (the Math Concepts and Math Computation tests of the California Achievement Tests) and one newly developed one, the Mathematics Applications Test, were the criteria for evaluating mathematics outcomes. In addition, a total score derived from the combination of measures for the three tests was computed. These tests are described in Volumes II and IV.

Partial correlations of prorated incidences of pupil events with mathematics outcomes.

In second grade classrooms where there is a high frequency of inappropriate conduct, obvious inattention to the classroom work, and talking out of turn, there is more likelihood that the achievement scores in mathematics will be less than predicted at the end of the year (Table 42). The frequency of observed pupil involvement with lessons implied by the "+ Engagement" events in second grade is significantly and positively related to second grade mathematics achievement on two measures.

Observable behavior associated with number concepts was not related to achievement except in the case of " Number Concepts" in fifth grade

Table 42

Partial Correlations of BTES APPLE Variable (Pupil Events) with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	CAT Math Concepts		CAT Math Computation		Math Application		Total Academic Math	
	2	5	2	5	2	5	2	5
+Academic Performance	.08	.09	-.24*	-.10	-.08	-.00	-.05	.03
+Attentiveness	.08	-.10	.24*	.04	-.14	.14	.12	.10
+Direction Following	.06	.08	-.06	.04	.30*	.11	.12	.02
+Engagement	.22*	.13	-.00	.02	.28*	.17	-.07	.14
+Participation	.20	.20*	.07	-.10	.17	-.03	.08	.10
+Volunteering	.07	.20*	.01	.06	.12	.18	.10	.20*
+Work Habits	-.05	-.18	-.10	-.06	.10	-.13	-.00	-.17
-Conduct	-.19	.20*	-.39*	-.06	-.21*	.06	-.61*	.04
-Inattention	.35*	-.08	-.34*	-.09	-.02	.03	-.18	.01
-Talking	-.38*	-.28*	-.16	-.23*	.01	-.34*	-.11	-.42*
0 Conduct	-.23*	-.15	.08	.00	.10	-.16	-.04	-.15
0 Engagement	.22*	.46*	-.09	.11	.13	.11	.01	.24*
0 Inattention	-.05	-.23*	.12	-.35*	-.08	-.52*	.02	-.51*
0 Work Habits	-.06	-.02	.06	-.16	.13	-.33*	.10	-.25*
+Number Concepts	-.07	.00	-.03	.05	-.11	.15	-.04	.13
-Number Concepts	.10	-.21*	-.17	-.19*	.04	.24*	-.02	-.01
0 Number Concepts	-.08	-.10	.25*	.16	.04	-.09	.17	-.07

* $p \leq .10$

and "O Number Concepts" in second grade. However, the pattern of the correlations having to do with "Number Concepts" were neither uniformly positive nor negative. A careful review of the test items and the characteristics of the classroom observation records might clarify these apparently contradictory findings.

Evidence of inattention which is not disruptive of classroom work ("O Inattention") is negatively correlated at a significant level with all of the fifth grade mathematics achievement measures. This finding can be interpreted to mean that when there is a great frequency of observations of possible inattention to the mathematics lessons at fifth grade, there is quite likely to be poorer end-of-year achievement in that classroom.

Partial correlations of prorated incidences of instructional contexts with mathematics outcomes. In general, the frequency of "Independent-Group" and "Independent-Class" contexts was negatively related to achievement outcomes. While a clearer picture of the quality of pupil behavior in these contexts in mathematics will be provided when we present the correlations of the time allocation data with achievement, the results on Table 43 suggest that classrooms in which pupils are working independently of the teacher in mathematics most of the time are those which are more likely to have poorer achievement outcomes.

Partial correlations of prorated incidences of teacher activities with mathematics outcomes. Several teaching activity variables are significantly correlated with the mathematics achievement measures (Table 44). However, only one of them, "Asking," has a significant relationship with more than one measure. Instructional activitiy in mathematics is not very observable, except for demonstrations at the board. Pupils are working independently on workbook or textbook assign-

Table 43

Partial Correlations of BTES APPLE Variables (Instructional Contexts) with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	Math Concepts		Math Computation		Math Application		Total Academic Math	
	2	5	2	5	2	5	2	5
Adult - Group	-.16	-.07	-.16	.15	-.31*	.02	-.23*	.05
Independent - Class	-.01	.00	-.04	-.18	-.08	-.23*	.06	-.21*
Independent - Group	-.04	-.23*	-.23*	.01	.13	-.08	-.24*	-.11
Independent - Individual	.04	-.02	.21*	.02	-.11	-.11	.25*	-.06
Teacher - Class	.01	.18	.04	.03	.04	.16	.07	.20*
Teacher - Group	-.13	.06	.02	.12	.04	.24*	-.10	.20*

* $p \leq .10$

Table 44

Partial Correlations of BTES APPLE Variables (Teacher Activities) with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	CAT Math Concepts		CAT Math Computation		Math Application		Total Academic Math	
	2	5	2	5	2	5	2	5
Academic Organizing	-.06	.01	-.16	.01	-.14	-.08	-.30*	.03
Answering	.02	.05	.08	.05	.02	-.10	.06	-.20
Asking	-.24*	.07	.01	.07	-.30*	-.13	-.04	.13
At Desk	.41*	-.00	-.12	-.00	-.18	.10	-.02	-.05
At Board	.28*	-.07	.04	-.07	-.08	.02	.08	.08
Checking	.29*	-.08	.05	-.08	.16	-.09	.10	-.08
Circulating	.12	.16	-.08	.16	.24*	.16	.12	.16
Discussion	.02	.03	.04	.03	-.07	.14	.03	-.20*
Explaining	-.15	.02	.03	.02	-.07	.02	.01	.13
Helping	-.29*	-.15	-.12	-.15	-.18	.02	-.09	-.05
Instruction Giving	.12	.09	.14	.09	.01	.11	.10	.08
Listening	-.18	.05	-.02	.05	-.04	-.24*	-.03	-.08
Question and Answer	.21*	.04	-.20	.04	.14	-.01	.07	.16
Supervising	.07	.13	.06	.13	.02	-.08	.13	.16
Working With	-.16	-.07	.12	-.07	.04	.17	-.09	.07

* p ≤ .10

ments, and teachers circulate around the room checking work, helping those who need it, or remaining at their desks available to those class members who need assistance. (Refer to Table 14 for the raw frequencies of teacher activities.) The prorated frequency of the "Asking" teacher activity was negatively correlated with outcomes. Reference to the lexicon definition presented earlier (Table 15) generates the hypothesis that teachers who spend time asking questions of their second grade pupils are those whose lessons are not understood; possibly their assignments are at an inappropriate level of difficulty for the pupils.

Partial correlations of prorated incidences of teacher responses with mathematics outcomes. Even though teacher activities in mathematics do not provide a clear picture of teacher differences which are related to outcomes, an examination of the number of significant partial correlations of teacher responses with achievement does show some interesting findings (Table 45). Teachers who are observed to employ more management techniques at second grade, such as "Disciplining" and "Recognizing", are those whose pupils are more likely to have poorer achievement. An explanation of these findings might be that the difficulty level or the interest level of the mathematics assignments is possibly not appropriate for some pupils and in those classes the teachers must intervene more often to keep the class in order. These may also be classrooms in which there are unrealistic expectations that pupils work by themselves and be attentive to the task.

At the fifth grade level, "Teacher Help" to pupils and providing "Positive Feedback" and "Praise" are teacher response variables which are positively correlated with end of the year mathematics achievement. All but one of the teacher response variables have a significant rela-

Table 45

Partial Correlations of BTES APPLE Variables (Teacher Responses) with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	CAT Math Concepts		CAT Math Computation		Math Application		Total Academic Math	
	2	5	2	5	2	5	2	5
Instructing	-.14	.13	.07	.03	-.03	-.17	.03	-.02
Disciplining	-.21*	.09	-.06	.04	-.16	.01	-.21*	.03
Teacher Help	-.07	.12	-.16	.34*	.07	.31*	-.15	.28*
Ignoring	.03	.10	-.02	-.06	.05	.27*	.05	.09
Moves On	-.01	-.03	-.08	-.22*	.05	.15	.05	-.07
Negative Feedback	-.08	.03	.12	-.08	-.27*	.26*	-.00	.11
None	.06	-.13	.08	-.09	.07	-.23*	-.00	-.20*
Positive Feedback	-.03	.23*	-.05	.01	-.12	.38*	.04	.35*
Praise	.16	.29*	.04	.04	.05	.11	.12	.25*
Questioning	.17	.08	.08	.06	.24*	.18	.08	.14
Recognizing	-.32*	-.28*	-.01	-.28*	-.28*	-.31*	-.08	-.41*
Redirecting	.25*	.01	-.05	.22*	-.28*	-.21*	.02	.09

* $p \leq .10$

tionship to one or more measures of mathematics achievement. These findings suggest that the more the teacher interacts with students about their mathematic lessons the better the learning outcomes.

Partial Correlations of Observation Variables with Pupil Attitude Outcomes

Four attitude measures were available from the fall and spring testing periods. These are described in other volumes of the BTES final report so we will comment only on the method used to obtain the outcome measures. Each second and fifth grade pupil took a reading and mathematics attitude test and a reading and mathematics survey. The attitude measure asked the pupil to indicate whether he had positive, neutral or negative feelings about reading and mathematics activities. The survey asked for a variety of information about self concept with respect to peers, school, and interests in different types of activities. Since the reading and mathematics sections of each pair of instruments correlated highly with one another, there was no reason to keep them separate as outcome measures. We decided, therefore, to use the total scores both from the reading and mathematics survey and from the reading and mathematics attitude measure as the two outcome measures in the partial correlation studies of our observation data.

Partial correlations of prorated incidences of pupil events in reading and in mathematics with attitude outcomes.

At second grade "+ Engagement" events in reading instruction correlate positively with the total attitude measures (Table 46). Evidence of anappropriate behavior in the classroom, as reflected in the average incidence of " Conduct" and " Talking" events in reading, correlate negatively with the total attitude measure. We could hypothesize, tentatively, that with respect to attitudes toward reading and mathematics, second grade reading lessons where target

Table 46

Partial Correlations of BTES APPLE Variables (Pupil Events) with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

	Pupil Events - Reading				Pupil Events - Mathematics			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	Grade		Grade		Grade		Grade	
	2	5	2	5	2	5	2	5
+ Academic Performance	-.08	.17	.24*	.04	-.27*	.16	-.07	.03
+ Attentiveness	.02	.05	.27*	.14	-.21*	.20	-.20	.08
+ Direction Following	-.13	.11	.23*	-.37*	.07	.14	-.13	.24*
+ Engagement	.22*	.11	-.01	.11	-.13	-.08	.10	.12
+ Participation	-.12	.04	.26*	-.43*	.01	.26*	.16	-.21*
+ Volunteering	.08	-.00	.20	-.41*	.14	.21*	.03	.17
+ Work Habits	.00	-.11	-.37*	.02	-.02	.13	-.09	-.27*
- Conduct	-.27*	-.20*	-.33*	.11	.12	.02	.07	.11
- Inattention	-.16	-.16	.13	.06	-.05	.15	-.05	.06
- Talking	-.30*	-.02	-.11	.11	.01	-.39*	-.17	-.18
0 Conduct	.01	.11	.00	.15	-.06	.03	.14	-.52*
0 Engagement	-.17	-.16	.01	.04	-.09	-.01	-.02	.23*
0 Inattention	.05	-.09	.04	-.08	-.13	-.25*	.03	-.17
0 Work Habits	-.19	-.03	-.41*	.08	-.16	-.36*	-.07	-.27*
+ Oral Reading	.18	.39*	.39*	.02				
+ Phonic Skills	.06	-.14	-.06	.01				
+ Reading Comprehension	.17	.15	.03	.16				
+ Number Concepts					-.02	.25*	.28*	-.01
- Number Concepts					.35*	-.03	.18	-.10
0 Number Concepts					-.12	.02	-.09	.02

* p ≤ .10

pupils are observed to be positively involved in the activities of the class, and where they are not misbehaving or talking inappropriately are those classrooms with the most positive changes in attitudes at the end of the year. Observations of " Conduct" events in fifth grade reading are also negatively correlated with the attitude outcome. Evidence of opportunities for "+ Oral Reading" are positively correlated at both grade levels. We could infer generally that at both second and fifth grade, classrooms in which there was positive evidence of involvement in the classroom reading activity and an absence of inappropriate behavior would be those classrooms where attitudes toward reading and mathematics would improve over the year.

When we review pupil events in mathematics at the second grade level, it is of interest to note that incidence of "+ Academic Performance" and "+ Attentiveness" events are negatively related to the total attitude measure. A good hypothesis to test would be that events such as "+ Attentiveness" occur in classrooms where the pupils are expected to be listening to the teacher explain a mathematics lesson -- for example, teachers might be asking questions of pupils to see if they know answers to problems. In these situations, it is possible that the greater the incidence of these patterns of activities, the less the opportunity for the pupil to explore and extend his mathematics skill at his own rate of learning. Consequently, attitudes toward reading and mathematics become less favorable.

At fifth grade, evidence of "+ Participation" and "+ Volunteering" in mathematics lessons are positively correlated with the attitude measure, suggesting that attitudes improve in classes where pupils are actively involved in interaction with the mathematics lesson material.

Evidence of some inappropriate, or marginally acceptable behaviors in fifth grade mathematics lessons is negatively correlated with attitude outcome.

Since several of the pupil survey items ask questions about how a pupil judges his abilities with respect to those of his peers, it is not surprising that some of the correlations between pupil event variables evidencing appropriate pupil behavior in reading and mathematics and the survey measure are negative at fifth grade. A pupil might be observed to be productively participating in classroom activities, but might view his own performance as less adequate than that of some of his peers. In such instances, one would expect a negative relationship to the survey items. However, at second grade, "+ Academic Performance", "+ Attentiveness", "+ Direction Following" and "+ Participation" during reading activities have a significant positive relationship to the survey measure. Since quite a different pattern emerged at fifth grade, this suggests an age difference in the implications of these types of observed positive pupil behavior on attitudes toward self worth.

Partial correlations of prorated incidences of instructional contexts in reading and in mathematics with attitude outcomes. Examination of the partial correlations between incidences of contexts with the attitude and survey measures is not by itself too productive of immediately testable hypotheses (Table 47). In all but one case, those contexts with significant relationships were those in which the teacher was in charge of instruction, either the "Teacher-Group" or "Teacher-Class" contexts. Grade level differences in the relationship also appear. "Teacher-Class" instruction in both reading and mathematics at the fifth grade level is positively correlated with the attitude

Table 47

Partial Correlations of BTES APPLE Variables (Contexts) with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

	Contexts - Reading				Contexts - Mathematics			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	Grade		Grade		Grade		Grade	
	2	5	2	5	2	5	2	5
Adult-Group	-.14	.09	-.00	.19	.18	-.00	-.00	-.02
Independent-Class	-.10	.14	-.16	.04	.23*	-.03	.00	-.09
Independent-Group	.11	-.02	-.01	.18	-.02	-.02	-.15	.02
Independent-Individual	-.11	-.09	-.15	.03	-.09	.03	-.09	.02
Teacher-Class	-.08	.20*	-.35*	-.03	-.11	.31*	.38*	-.11
Teacher-Group	.21	-.03	.38*	-.27*	.02	-.03	-.24*	.17

* $p \leq .10$

measure. At second grade, incidence of this context is positively correlated with the survey measure for mathematics and negatively correlated for reading lessons. The reverse is true of the relationship between incidence of the "Teacher-Group" context and the second grade survey measure. In this case, "Teacher-Group" instruction in reading is positively correlated with the classroom average survey score while the incidence of this context in mathematics is negatively related to scores on the survey. Since "Teacher-Group" instruction is more common in reading than in mathematics, it would be necessary to find out more about the kinds of teaching activities and teacher responses which take place in reading and mathematics groups in order to clarify these differing significant relationships. These are hypotheses which should be tested in future research.

Partial correlations of prorated incidences of teacher activities in reading and in mathematics with attitude outcomes. The analysis of the relationship of teacher activities in reading and mathematics to the attitude and survey measures also demonstrates the possibility of positive and negative correlations of some teacher activities depending on the type of instruction and the grade level (Table 48). Being "At Board" during second grade reading instruction is positively correlated with the attitude measures but negatively correlated when it occurs in fifth grade reading. The incidence of being "At Board" during second grade mathematics is negatively related to both the attitude and the survey measures. However, the frequency with which teachers are "At Board" in fifth grade mathematics is positively correlated with the attitude measure.

Table 48

Partial Correlations of BTES APPLE Variables (Teacher Activities) with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

	Teacher Activities - Reading				Teacher Activities - Mathematics			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	Grade		Grade		Grade		Grade	
	2	5	2	5	2	5	2	5
Academic Organizing	.03	.06	-.12	.14	-.19	.06	.05	.14
Answering	-.24*	-.07	.13	-.04	-.09	-.18	.11	.12
Asking	-.06	.13	.10	-.38*	-.04	.17	.23*	.02
At Desk	.01	-.08	.05	.04	-.09	.09	-.10	.02
At Board	.23*	-.35*	.10	-.09	-.47*	.26*	-.30*	.11
Checking	-.00	.29*	.22*	.05	.15	-.07	.40*	-.07
Circulating	.14	-.30*	-.28*	.04	.02	-.06	-.15	-.17
Discussion	-.19	-.08	-.08	-.03	-.11	-.00	-.19	.04
Explaining	.11	.06	.10	.06	.14	.10	.12	-.23*
Helping	-.16	.09	-.41*	.16	-.01	-.08	-.14	.11
Instruction Giving	-.41*	-.23*	.13	-.22*	-.15	.12	.03	-.03
Listening	-.10	.35*	.23*	.17	-.08	.13	.20	-.10
Question and Answer	.37*	.05	.05	.14	-.04	.14	.06	.08
Supervising	.03	.10	-.03	.03	.23*	.18	.30*	-.00
Working With	.06	-.03	.09	-.02	.03	.20*	-.02	.16

* $p \leq .10$

Some teacher activities which are related to attitude are always positively correlated with attitude and survey outcomes whenever the correlations are significant. Some of these activities with significant positive relationships are "Checking", "Listening" and "Supervising". The activities which always have a negative relationship to attitudes when significant are "Circulating" and "Instruction Giving". "Checking", "Listening" and "Supervising" imply positive or neutral interest of the teacher, while "Circulating" and "Instruction Giving" suggest movement around requirements of the lesson. Some of these activities correlate positively with achievement because they are evidence of teacher's degree of involvement in the work of teaching. However, these same activities may relate negatively to attitude outcomes because such teacher responses cause children to feel less positively about their abilities to do the school work.

Partial correlations of prorated incidences of teacher responses in reading and in mathematics with attitude outcomes. Teacher responses to pupil behavior have differing relationships to attitudes depending on whether the teacher behavior is observed in reading or in mathematics and whether the pupils are second or fifth graders. In reviewing Table 49, it is important to consider that pupil attitudes toward reading and mathematics, as well as their feelings of self worth, will be dependent not only on how the teacher responds to them, but also on how this response affects their self perception. For example, the incidence of "Disciplining" was negatively related to reading attitude when it occurred in second grade reading instruction, but positively associated with the survey measure when it was observed in second grade mathematics. One could explain this apparently disparate

Table 49

Partial Correlations of BTES APPLE Variables (Teacher Responses) with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

	Teacher Responses - Reading				Teacher Responses - Mathematics			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	Grade		Grade		Grade		Grade	
	2	5	2	5	2	5	2	5
Instructing	-.16	-.31*	.13	-.14	.09	-.03	-.10	.15
Disciplining	-.25*	.13	.20	.01	-.09	-.15	.36*	-.27*
Teacher Help	.15	-.18	.06	.15	.26*	-.12	.05	.15
Ignoring	-.04	.12	.10	-.05	-.23*	.05	-.08	.05
Moves On	-.07	.14	.17	-.27*	.31*	-.01	.21*	-.03
Negative Feedback	-.08	.07	-.29*	.08	-.05	.26*	.45*	-.03
None	.05	-.06	-.14	.23*	-.04	-.02	-.18	-.10
Positive Feedback	.26*	.12	.15	.05	-.19	.23*	.12	.10
Praise	.18	.16	-.05	-.32*	-.11	.03	.02	.13
Questioning	-.14	.16	-.09	.04	.22*	.16	.19	.12
Recognizing	.06	.01	.00	-.54*	-.02	-.34*	-.11	-.03
Redirecting	.07	-.15	.13	.13	.22*	.26*	.17	.13

* $p \leq .10$

finding by hypothesizing that when teachers discipline pupils in reading, pupils are less likely to respond positively to items assessing the degree to which they enjoy reading activities. On the other hand, pupils of the same age may perceive the legitimate use of teacher discipline as an awareness of individual differences in their own behaviors, which in turn changes their self concept. At the least we would have to state that the incidence of disciplining in a classroom cannot always be judged as lowering the general attitude in the classroom.

While one cannot infer from these data the the extent of the use of disciplining will be negatively related to the average classroom level of attitude and self concept, neither can one infer that the frequency of "Negative Feedback" is a predictor of decrease in attitude or self concept. While the number of pupil events which receive a teacher response of "Negative Feedback" is inversely correlated with the second grade pupil survey results for reading, instances of "Negative Feedback" in mathematics have positive correlations with the survey measure in second grade and the attitude measure in fifth grade. The extent of "Positive Feedback" is always positively related to attitudes when the partial correlations are significant. Neutral teacher management techniques and teacher responses such as "Moves On" and "Redirecting" are also mostly positive in relation to both attitude outcome measures. One gets the impression from the examination of the data and from the analysis of the relationship between teacher activities and pupil attitudes, that teacher behavior which calls attention to children, and perhaps places them in an unfavorable comparison to their classmates, may affect attitude changes even thought these same teacher behaviors have a positive relationship to achievement outcomes.

Overview of the Relationship of Observation Variables to Achievement and Attitude Outcomes

Even though we have prepared numerous tables to present the findings from the APPLE observation phase of the BTES project, and another set of summary findings might seem unnecessary, we believed that tables which present an overview of the most promising observation variables would be valuable. Accordingly we prepared Tables 50, 51, and 52 to summarize the relationship of pupil events, teacher activities and teacher responses with the outcome measures. In these tables we have indicated, within achievement area and grade level, those variables which have a significant relationship to two or more outcome measures. This, of course, is an arbitrary criterion. However, in the absence of more detailed information on the psychometric properties of the achievement measures, we felt that it was a fair criterion to use. The direction of the relationships is indicated with the use of "+" and "-" signs. In attempting to summarize the findings from the attitude measures (see Tables 52A, 52B, and 52C), we decided that a variable which was significantly correlated for both grade levels within each outcome measure would be included. In these summary tables we have not included the data reporting correlations with instructional context because a more detailed presentation of the correlations between time allocation in context measures and outcome will follow.

Forty-seven APPLE variables (excluding instructional context) were idenditified from the total set of observations on the basis of the frequency counts in the observation record. There were 20 pupil events, 15 teacher activities and 12 teacher responses. Of these, the great majority could be considered of potential value when variables were included which were significantly related to either reading or mathematics achievement at one grade level or which appeared to have a significant relationship to an attitude measure across both grade levels. There are enough differences in classroom instruction between grade levels and between reading and mathematics instruction that we hesitate to generalize across grades and instructional areas. Teacher performance data which can invariably be assumed valid for predicting pupil achievement or attitude outcomes may not exist.

Table 50

Summary of Observational Variables with Significant Partial Correlations with Two or More Outcome Measures - Pupil Events

	Outcome Measures			
	Reading		Mathematics	
Pupil Events	2	5	2	5
+ Academic Performance		(+-)		
+ Attentiveness		(+++)		
+ Direction Following				
+ Engagement			(++)	
+ Participation		(---)		
+ Volunteering				(++)
+ Work Habits				
- Conduct				
- Inattention			(---)	
- Talking	(----)			(----)
0 Conduct	(-----)			
0 Engagement	(--)			(++)
0 Inattention	(++++)	(--)		(----)
0 Work Habits				(--)
+ Oral Reading		(+++)		
+ Phonic Skills	(++)	(--)		
+ Reading Comprehension				
+ Number Concepts				
- Number Concepts				(+--)
0 Number Concepts				

Table 51

Summary of Observational Variables with Significant Partial Correlations with Two or More Outcome Measures - Teacher Activities

Teacher Activities	Outcome Measures: Reading 2	Reading 5	Mathematics 2	Mathematics 5
Academic Organizing	(---)			
Answering		(+-)		
Asking	(+-)		(--)	
At Desk				
At Board				
Checking	(+++)			
Circulating				
Discussion				
Explaining				
Helping				
Instruction Giving	(--)	(--)		
Listening				
Question & Answer				
Supervising	(--)			
Working with Groups or Individuals				

Table 52

Summary of Observational Variables with Significant Partial Correlations with Two or More Outcome Measures - Teacher Responses

Teacher Responses	Outcome Measures Reading 2	 5	 Mathematics 2	 5
Instructing	(++)			
Disciplining			(--)	
Teacher Help				(+++)
Ignoring				
Moves On		(--)		
Negative Feedback				
None				(--)
Positive Feedback	(++++)			(+++)
Praise	(++)			(++)
Questioning				
Recognizing			(--)	(----)
Redirecting	(--)		(+-)	(+-)

Table 52A

Summary of Observational Variables with Significant Partial Correlations Across Second and Fifth Grades and Reading and Mathematics - Pupil Events

	Outcome Measures	
Pupil Events	Total Attitude	Total Survey
+ Academic Performance		
+ Attentiveness		
+ Direction Following		(++-)
+ Engagement		
+ Participation		(+--)
+ Volunteering		
+ Work Habits		(--)
- Conduct	(--)	
- Inattention		
- Talking	(--)	
0 Conduct		
0 Engagement		
0 Inattention		
0 Work Habits		(--)
+ Oral Reading		
+ Phonic Skills		
+ Reading Comprehension		
+ Number Concepts		
- Number Concepts		
0 Number Concepts		

Table 52B

Summary of Observational Variables with Significant Partial Correlations Across Second and Fifth Grades and Reading and Mathematics - Teacher Activities

Teacher Activities	Outcome Measures Total Attitude	Total Survey
Academic Organizing		
Answering		
Asking		(-+)
At Desk		
At Board	(++--)	
Checking		(++)
Circulating		
Discussion		
Explaining		
Helping		
Instruction Giving	(--)	
Listening		
Question & Answer		
Supervising		
Working with Groups or Individuals		

Table 52C

Summary of Observational Variables with Significant Partial Correlations Across Second and Fifth Grades and Reading and Mathematics - Teacher Responses

Teacher Responses	Outcome Measures Total Attitude	 Total Survey
Instructing		
Disciplining		(+-)
Teacher Help		
Ignoring		
Moves On		(+-)
Negative Feedback		(+-)
None		
Positive Feedback	(++)	
Praise		
Questioning		
Recognizing		
Redirecting	(++)	

Partial Correlations of Time Allocation Variables with Reading Achievement Outcomes

In an earlier section we described the six time allocation variables derived from the Observer Summary Report. For both reading and mathematics, the time variables are: (1) the mean number of minutes per student per day in each context, (2) the mean number of productive minutes per student per day in each context, (3) the mean percent total minutes per student per day, (4) the mean percent productive minutes per student per day, (5) the mean percent gross time per student per day, and (6) the mean percent gross productive time per student per day. These measures provide us with the actual time spent in each context, the number of actual minutes that were judged to be productive, and estimates of the average proportion of time students in each class were in each context (and the average proportion of time students in each class were in each context) and the average proportion of productive time. In determining the proportion, the reader will recall that the percents were averaged across students for variables 3 and 4 above, and the percents also were computed by obtaining the total amount of time across all students and then dividing this into the total amount of time in each context for variables 5 and 6. (See pp. 62-63 for a complete description of the computation procedures.)

We did not use the proportion of productive time measures (variables 4 and 6) in the computation of the partial correlations. We made this decision because of the relative infrequency of the "Independent-Individual" context, the "Teacher-Individual" context, and the adult contexts. We attempted to compute the correlations for those classrooms in which these contexts were observed, but the numbers were too few to obtain meaningful correlations. We decided instead to use the mean number of minutes (variable 1), the mean number of productive minutes (variable 2), the mean percent total minutes (variable 3), and the mean percent gross time (variable 5) as the predictor variables.

In this discussion we will present the findings relating time variables to outcomes by instructional area and grade level. On the basis of the results reported thus far, we expect that the relationship of these variables to outcome measures will differ with respect to grade and curriculum area.

Partial correlations of time allocation variables with reading outcome measures in second grade. Table 53 presents the partial correlations of the mean number of minutes with the several reading achievement measures for second and fifth grades. As this table and Tables 54, 55, and 56 demonstrate, the only variable with a significant correlation to the CAT Reading Comprehension test at second grade is time allocated to the Independent-Individual context, which correlates positively. However, time in this context at second grade is negatively correlated with the Reading Application test, suggesting that the types of reading lessons pupils use when working individually and independently of the teacher may be an important factor. The correlation between the Independent-Individual context in second grade and CAT Reading Comprehension is positive and significant regardless of the time variable used. The more productive the student time in context, the better the achievement, and the greater the proportion of time in this context, the better the CAT Reading Comprehension scores. The negative correlation of this context with Reading Application persists at a significant level only when the time variables were the actual number of minutes or the actual

Table 53

Partial Correlations of BTES APPLE Time Variables
(Mean Number of Minutes Per Student Per Day in Reading Contexts)
with Spring Outcome Scores Controlling for Fall Scores-Reading Tests

Context	CAT Reading Comprehension 2	CAT Reading Comprehension 5	Reading Application 2	Reading Application 5	Decoding Total 2	Decoding Total 5	Reading Achievement 2	Reading Achievement 5	Total Academic Reading 2	Total Academic Reading 5
T-Class	.00	.23*	.03	.02	.49*	-.08	.09	.14	-.01	.09
I-Class	.09	.03	.06	.05	.14	.00	.20	.32*	.04	.14
T-Group	.18	.05	.12	-.07	-.17	-.12	-.02	-.12	.01	-.05
I-Group	-.03	-.09	-.10	-.07	-.25*	-.01	-.24*	-.12	-.11	-.11
T-Individual	.14	-.12	-.09	-.06	.01	.23*	.02	-.30*	-.02	-.13
I-Individual	.28*	-.08	-.21*	-.01	.03	.04	.05	-.04	-.04	-.07
A-Class										
A-Group	-.20	.17	.13	.08	-.18	.12	-.04	-.15	.02	.06
A-Individual	.08	-.03	-.01	.05	.18	.06	-.05	-.18	-.03	-.09
Test	-.15	-.06	.01	-.01	-.27*	-.05	.01	.03	-.11	.07

*$p \leq .10$

Table 54

Partial Correlations of BTES APPLE Time Variables
(Mean Number Productive Minutes Per Student Per Day in Reading Contexts)
with Spring Outcome Scores Controlling for Fall Scores-Reading Tests

Context	CAT Reading Comprehension		Reading Application		Decoding Total		Reading Achievement		Total Academic Reading	
	2	5	2	5	2	5	2	5	2	5
T-Class	.04	.23*	.08	.02	.50*	-.08	.13	.14	.02	.09
I-Class	.12	.03	.08	.12	.23*	.03	.18	.34*	.06	.19*
T-Group	.11.	.02	-.00	-.08	-.37*	-.11	-.12	-.12	-.05	-.08
I-Group	-.01	-.10	-.01	-.04	-.23*	-.03	-.17	-.10	-.03	-.09
T-Individual	.20	-.15	-.11	-.04	.01	.22*	.07	-.25*	.00	-.08
I-Individual	.30*	-.13	-.21*	.01	.02	.07	.06	-.03	-.04	-.07
A-Class										
A-Group	-.20	.18	.12	.08	-.15	.11	-.03	-.14	.02	.06
A-Individual	.09	-.03	-.05	.05	.21*	.06	-.02	-.18	-.03	-.09
Test	-.10	-.06	-.14	-.01	-.17	-.05	-.05	.03	-.14	.07

*$p \leq .10$

Table 55

Partial Correlations of BTES APPLE Time Variables
(Mean Percent Total Minutes Per Student Per Day in Reading Contexts)
with Spring Outcome Scores Controlling for Fall Scores-Reading Tests

Context	CAT Reading Comprehension 2	CAT Reading Comprehension 5	Reading Application 2	Reading Application 5	Decoding Total 2	Decoding Total 5	Reading Achievement 2	Reading Achievement 5	Total Academic Reading 2	Total Academic Reading 5
T-Class	-.19	.08	-.07	-.03	.46*	-.23*	.07	.12	-.10	.04
I-Class	.01	.07	-.03	.05	.08	-.01	.12	.26*	-.03	.13
T-Group	.15	.04	.13	-.09	-.23*	-.08	.02	-.14	.08	-.09
I-Group	-.07	-.08	.00	.01	-.20	.12	-.23*	-.15	.03	-.05
T-Individual	.07	-.13	-.07	-.06	-.04	.23*	-.03	-.28*	-.05	-.11
I-Individual	.30*	-.13	-.14	-.04	-.04	.06	.05	-.07	.00	-.12
A-Class										
A-Group	-.20	.08	.19	.05	-.17	.17	.06	-.22	.10	.00
A-Individual	.11	-.03	-.00	.05	.15	.06	-.08	-.18	-.01	-.09
Test	-.13	-.06	-.04	-.01	-.24*	-.05	.01	.03	-.12	.07

$^*p \leq .10$

Table 56

Partial Correlations of BTES APPLE Time Variables (Mean Percent Gross Time Per Student Per Day in Reading Contexts) with Spring Outcome Scores Controlling for Fall Scores-Reading Tests

Context	CAT Reading Comprehension		Reading Application		Decoding Total		Reading Achievement		Total Academic Reading	
	2	5	2	5	2	5	2	5	2	5
T-Class	-.19	.09	-.08	-.01	.44*	-.17	.03	.15	-.12	.07
I-Class	.01	.05	-.05	.07	.09	-.02	.11	.24*	-.04	.12
T-Group	.13	.05	.20	-.04	-.22*	-.11	.04	-.14	.09	-.05
I-Group	-.04	-.12	-.01	-.04	-.20	.13	-.21	-.17	.04	-.10
T-Individual	.10	-.14	-.09	-.05	-.03	.23*	.00	-.27*	-.04	-.09
I-Individual	.31*	-.04	-.16	-.03	.00	.05	.08	-.04	.00	-.08
A-Class										
A-Group	-.23*	.08	.16	.05	-.16	.17	.06	-.22*	.08	.01
A-Individual	.10	-.03	-.04	.05	.17	.06	-.05	-.18	-.03	-.09
Test	-.13	-.06	-.05	-.01	-.24*	-.05	-.02	.03	-.13	.07

*p ≤ .10

number of productive minutes. The proportion of time in this context is not significantly correlated with reading application.

While the amount of time pupils worked independently and productively in individual contexts is correlated with the reading comprehension measures at second grade, time spent by the teacher conducting a lesson for the entire class is significantly correlated with the Decoding Test at that level. The correlations are quite high (.44 to .50) for all time allocation measures. In contrast, the amount of time spent in the Independent-Group contexts, the contexts in which pupils work independently of the teacher on group assignments, is negatively correlated with the Decoding Test at second grade. Here we have clear evidence that the learning of decoding skills at second grade appears to be dependent on the amount of instructional time during which the teacher is actively directing the learning of the class. The fact that the Teacher-Group context does not show positive and significant correlations with the Decoding Test seems to indicate that instruction in second grade reading group learning situations does not emphasize decoding skills, but perhaps reading comprehension or oral reading skills. Since there were no measures of oral reading in the set of outcome measures, it is not possible to determine whether there is a relationship between any of these time measures in contexts and oral reading skill.

The fact that the correlations are always negative when time spent in the Independent-Group contexts is correlated with the second grade reading measures presents an interesting puzzle. We might assume that the more time a pupil spends learning, the better the learning outcome. One explanation of this finding is that the time measures may have a curvilinear relationship to achievement. There is a range of time in context when learning is optimum. Either less or more time than that at which learning is at a peak level produces poorer outcomes. To test that hypothesis it would be necessary to explore ways of charting classroom achievement with respect to time allocation in order to determine what time ranges in each context for each outcome have the greatest learning payoff.

Partial correlation of time allocation variables with reading outcome measures in fifth grade. At the fifth grade level where reading instruction is frequently carried on in Independent-Class contexts, it is time spent in the Teacher-Individual context which is significantly and positively correlated with the Decoding Test. This finding and the evidence from the second grade data suggest that if decoding skills are to be learned, they are learned in instructional contexts where teachers are actively directing the learning; the more time spent, the better the learning outcome. At fifth grade few pupils need assistance with decoding skills. However, those teachers who spend time individually with pupils who do need extra assistance have significantly greater improvement in decoding than those who do not.

While gain in reading comprehension skills for second graders is associated with the amount of time pupils spend working individually and independently of the teacher, at the fifth grade the actual number of minutes and the number of productive minutes (though not the proportion of time) spent by pupils in Teacher-Class contexts are positively and significantly correlated with the CAT Reading Comprehension Test. We have to assume that teacher-directed reading instruction at fifth grade is positively associated with improved decoding and reading comprehension skills and that decoding skills are most effectively taught in individual rather than group or class situations at that grade level.

Partial correlations of time allocation variables with mathematics outcomes in second grade. For second graders the most effective context time allocations for mathematics learning were the individual contexts -- Independent-Individual, Adult-Individual and Teacher-Individual. The reader will recall that we have reported that these individual contexts where pupils are working on individualized mathematics assignments are not common in the BTES classrooms and that most of the instruction is either by class or by group. The consistently positive correlations of the individual contexts with mathematics learning in second grade indicate that learning outcomes in these contexts are directly related to the amount of time students spend in them (Tables 57 through 60).

Partial correlations of time allocation variables with mathematics outcomes in fifth grade. It is interesting that the most effective use of teacher time in fifth grade mathematics was the Teacher-Class context. The amount of time and the proportion of time spent in this context is consistently and positively related to mathematics learning. Learning fifth grade mathematics, like decoding skills in reading, appears to be dependent upon the amount of time teachers direct pupils in instruction. Both mathematics and decoding skills require rule and principle learning, and practice in applying these rules and principles. The more time the teacher spends directing these learning experiences, the better the learning outcomes will be. Conversely, the time pupils spend on assignments where the same activity is assigned to all pupils is negatively related to mathematics achievement (Individual-Class context).

Table 57

Partial Correlations of BTES APPLE Time Variables
(Mean Number of Minutes Per Student Per Day in Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

Context	CAT Math Concepts		CAT Math Computation		Math Application		Total Academic Math	
	2	5	2	5	2	5	2	5
T-Class	.18	.20*	.10	.01	-.16	.18	.14	.38*
I-Class	.13	-.02	-.06	-.11	-.02	-.18	.09	-.20*
T-Group	.07	.02	-.12	.02	.04	.11	-.08	-.04
I-Group	-.09	-.16	.04	.04	.20	.08	-.08	.00
T-Individual		.18		.15		.14		.10
I-Individual	.10	.00	.07	.05	.46*	-.17	.13	-.13
A-Class		-.01		.04		-.04		.21*
A-Group	-.27*	-.19	-.30*	.06	-.12	.05	-.42*	-.06
A-Individual	-.14	-.20*	.27*	-.09	-.03	-.06	.09	.15
Test	.12	-.03	-.13	.18	-.12	-.04	-.04	.07

$*p \leq .10$

Table 58

Partial Correlations of BTES APPLE Time Variables
(Mean Number of Productive Minutes Per Student Per Day in Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

Context	CAT Math Concepts 2	CAT Math Concepts 5	CAT Math Computation 2	CAT Math Computation 5	Math Application 2	Math Application 5	Total Academic Math 2	Total Academic Math 5
T-Class	.20	.23*	.09	.00	-.16	.18	.12	.36*
I-Class	.14	-.02	-.08	-.08	-.04	-.12	.07	-.15
T-Group	.06	.01	.00	-.03	.05	.10	.06	-.03
I-Group	-.13	-.16	.14	.04	.21	.07	.03	-.00
T-Individual								
I-Individual	.10	-.04	.07	-.05	.47*	-.25*	.14	-.12
A-Class		.00		.05		-.04		.22*
A-Group	-.33*	-.19	-.32*	.06	-.05	.05	-.41*	-.06
A-Individual	.00	-.20*	.41*	-.09	.22*	-.06	.20	.15
Test	.12	-.08	-.13	.12	-.12	-.10	-.04	.09

*p ≤ .10

Table 59

Partial Correlations of BTES APPLE Time Variables
(Mean Percent Total Minutes Per Student Per Day in Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

Context	CAT Math Concepts		CAT Math Computation		Math Application		Total Academic Math	
	2	5	2	5	2	5	2	5
T-Class	.12	.20*	.09	.03	-.23*	.20*	.12	.21*
I-Class	.12	-.05	-.08	-.13	-.08	-.27*	.07	-.22*
T-Group	-.03	.02	-.12	-.02	.01	.18	-.13	.11
I-Group	-.23*	-.21*	-.01	.03	.12	.15	-.16	.02
T-Individual	.09	.11	.35*	-.05	.43*	-.01	.26*	.10
I-Individual	-.00	.02	.07	.08	.46*	-.29*	.16	-.16
A-Class		-.01		.04		-.17		-.04
A-Group	-.28*	-.16	-.31*	.12	-.08	.06	-.43*	.07
A-Individual	-.15	-.14	.22*	-.04	-.05	.08	.07	-.05
Test	.12	.04	-.13	.29*	-.12	.02	-.04	.04

$*p \leq .10$

Table 60

Partial Correlations of BTES APPLE Time Variables
(Mean Percent Gross Time Per Student Per Day Spent in Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

Context	CAT Math Concepts 2	CAT Math Concepts 5	CAT Math Computation 2	CAT Math Computation 5	Math Application 2	Math Application 5	Total Academic Math 2	Total Academic Math 5
T-Class	.13	.22*	.10	.07	-.24*	.21*	.12	.23*
I-Class	.13	-.08	-.03	-.17	-.04	-.28*	.11	-.25*
T-Group	-.05	.03	-.16	-.01	-.02	.17	-.15	.11
I-Group	-.22*	-.19	-.01	.04	.16	.15	-.14	.04
T-Individual	.06	.21*	.25*	.08	.38*	.06	.20	.17
I-Individual	.04	.03	.18	.12	.53*	-.27*	.20	-.13
A-Class		.00		.06		-.17		-.03
A-Group	-.29*	-.16	-.25*	.12	-.05	.06	-.38*	.07
A-Individual	-.13	-.20*	.25*	-.09	-.03	.06	.10	-.06
Test	.12	-.01	-.13	.24*	-.12	.03	-.04	-.01

$^*p \leq .10$

Partial Correlations of Time Allocation Measures with Pupil Attitude Outcomes

Second grade pupil attitude toward reading and mathematics does not seem to be affected by the amount of time spent in any of the instructional contexts. The possible exception to this generalization is that the more time the second grade teacher spends in Teacher-Class instruction, the more negative pupils' attitudes about learning become (Tables 61 through 64).

In fifth grade, time devoted to Teacher-Class instruction in both reading and mathematics is positively and significantly correlated with positive change in attitude. It is interesting to note again the importance of time spent by pupils in teacher-directed instruction in decoding skills and in mathematics achievement. One possible inference is that fifth grade pupils who learn skills in word attack or mathematics have more positive attitudes at the end of the year.

The survey measure reflects self appraisal of competence in school and other aspects of self differentiation. Several of the time variables are significantly related to positive changes on the survey measure. At the second grade level, time in individual contexts in reading is negatively correlated with the total survey measure while time in group contexts is positively correlated. These data suggest that the more a pupil's learning experiences differ from those of his classmates, the poorer the self-concept outcome (even though time in these contexts is positively related to achievement). This generalization is supported to some extent by the correlations of time in Teacher-Class contexts for second grade mathematics.

Table 61

Partial Correlations of BTES APPLE Time Variables
(Mean Number of Minutes Per Student Per Day in Reading or Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

Context	READING				MATHEMATICS			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	2	5	2	5	2	5	2	5
T-Class	.04	.34*	.17	.00	-.23*	.38*	.29*	-.16
I-Class	.10	.11	.07	.15	.18	-.20*	.10	.05
T-Group	.09	-.04	.36*	-.38*	.06	-.04	-.01	.16
I-Group	.04	-.14	.40*	-.13	.01	.00	-.11	-.15
T-Individual	.04	-.08	-.11	.13		.10		.08
I-Individual	.03	-.17	-.24*	.12	-.10	-.13	.07	.06
A-Class						.21*		.04
A-Group	-.04	.14	-.03	.14	.07	-.06	-.13	-.04
A-Individual	.00	.21*	-.35*	.09	.15	.15	.09	.05
Test	.07	.01	-.03	-.00	-.05	.07	.13	.06

*$p \leq .10$

Table 62

Partial Correlations of BTES APPLE Time Variables
(Mean Number of Productive Minutes Per Student Per Day in Reading or Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

Context	READING				MATHEMATICS			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	2	5	2	5	2	5	2	5
T-Class	.06	.36*	.17	.03	-.24*	.36*	.36*	-.12
I-Class	.10	.24*	.07	.13	.16	-.15	.06	.08
T-Group	.11	-.03	.48*	-.41*	-.03	-.03	-.09	.14
I-Group	.12	-.15	.44*	-.11	-.01	-.00	-.12	-.11
T-Individual	.03	-.02	-.19	.13				
I-Individual	.04	-.08	-.23*	.14	-.10	-.12	.07	.03
A-Class						.22*		.04
A-Group	-.07	.15	-.04	.13	.05	-.06	-.15	-.04
A-Individual	.03	.21*	-.39*	.09	-.08	.15	.16	.05
Test	-.00	.01	-.06	-.00	-.06	.09	.13	.05

*$p \leq .10$

Table 63

Partial Correlations of BTES APPLE Time Variables
(Mean Percent Total Minutes Per Student Per Day in Reading or Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

Context	READING				MATHEMATICS			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	2	5	2	5	2	5	2	5
T-Class	.05	.34*	.07	.06	-.18	.36*	.20	-.16
I-Class	.05	.00	.00	.15	.17	-.36*	.06	.07
T-Group	.10	-.07	.08	-.37*	.02	-.04	-.12	.17
I-Group	-.14	-.10	.11	-.08	.06	.03	-.18	-.10
T-Individual	.05	-.06	-.06	.14	-.10	-.21*	-.04	.04
I-Individual	.01	-.17	-.25*	.11	.04	-.13	-.08	.06
A-Class						.21*		.04
A-Group	-.06	.11	-.06	.16	.10	-.07	-.12	-.04
A-Individual	-.05	.21*	-.35*	.09	.15	.21*	.08	.08
Test	.05	.01	-.05	-.00	-.05	.03	.13	.07

*p ≤ .10

Table 64

Partial Correlations of BTES APPLE Time Variables
(Mean Percent Gross Time Per Student Per Day in Reading or Mathematics Contexts)
with Spring Outcome Scores Controlling for Fall Scores - Attitude Outcomes

Context	READING				MATHEMATICS			
	Total Attitude		Total Survey		Total Attitude		Total Survey	
	2	5	2	5	2	5	2	5
T-Class	.02	.35*	.09	.05	-.19	.35*	.20	-.14
I-Class	.02	.05	-.00	.15	.18	-.37*	.03	.06
T-Group	.09	-.07	.15	-.36*	.06	-.05	-.10	.17
I-Group	-.08	-.14	.13	-.08	.04	.02	-.23*	-.09
T-Individual	.05	-.04	-.10	.14	-.14	-.08	-.00	.09
I-Individual	-.01	-.19	-.29*	.12	-.04	-.13	.01	.07
A-Class						.22*		.04
A-Group	-.09	.10	-.09	.16	.05	-.07	-.14	-.04
A-Individual	-.01	.21*	-.35*	.09	.13	.15	.06	.05
Test	.04	.01	-.04	-.01	-.05	.05	.13	.07

*p ≤ .10

Overview of the Relationship of Context Time Allocation Variables to Achievement and Attitude Outcomes

In the following table (Table 64A) we summarize, for reading and mathematics, those context time allocation variables which have a significant relationship to two or more outcome measures. Within the cells of the tables are listed the particular contexts for which the time measures (listed in column 1) showed a significant relationship to achievement. The direction of the relationship among the various context time allocation variables and the achievement tests with which they were correlated is indicated by the use of "+" and "-" signs after the context designation. For the summary with the attitude measures (Table 64B) we included those contexts which had a significant correlation across both grade levels within each of the two attitude tests.

Table 64A

Summary of Context Time Allocation Variables with Significant Partial Correlation with Two or More Outcome Measures - Achievement Tests

Time Allocation Variables	Reading		Mathematics	
	2	5	2	5
Mean Number Minutes Per Student Per Day in Context	I-G(--) I-I(+-)	T-I(+-)	A-G(---)	T-C (++)
Mean Number Productive Minutes Per Student Per Day in Context		I-C(++)	A-G(---) A-I(++)	T-C (++)
Mean Percent Total Minutes Per Student Per Day in Context		T-I(+-)	T-I(+++) A-G(---)	T-C (+++) I-C (--)
Mean Percent Gross Time Per Student Per Day in Context		T-I(+-)	T-I(++) A-G(---)	T-C (+++) I-C (--)

Legend:

T-C	Teacher in charge of class	I-I	Individual working independently
I-C	Class working independently	A-C	Aide in charge of class
T-G	Teacher in charge of group	A-G	Aide in charge of group
I-G	Group working independently	A-I	Aide in charge of individual
T-I	Teacher in charge of individual		

Table 64B

Summary of Context Time Allocation Variables with Significant Partial Correlation Across Second and Fifth Grades and Reading and Mathematics - Attitude Measures

Time Allocation Variables	Outcome Measures	
	Total Attitude	Total Survey
Mean Number of Minutes Per Student Per Day in Context	T-C(++-)	T-G(+-)
Mean Number Productive Minutes Per Student Per Day in Context	T-C(++-)	T-G(+-)
Mean Percent Total Minutes Per Student Per Day in Context	T-C(++-) A-I(++)	
Mean Percent Gross Time Per Student Per Day in Context	T-C(++)	

Legend:	T-C	Teacher in charge of class	I-I	Individual working independently
	I-C	Class working independently	A-C	Aide in charge of class
	T-G	Teacher in charge of group	A-G	Aide in charge of group
	I-G	Group working independently	A-I	Aide in charge of individual
	T-I	Teacher in charge of individual		

Comparisons Between Teachers With Better Than Predicted and Poorer Than Predicted Achievement Outcomes Using Crosstabulations of Observational Categories

The data thus far illustrate the variety of information, obtained through observations, which can be used to measure teacher performance and which has a potentially valid relationship to achievement and attitude outcomes. Except for the time allocation data, the presentation of results has treated the sets of observation variables as though they were items in a category observation system. The sets of variables, or the categories, are: instructional context, teacher activities, pupil events and teacher responses. The interrelationships among the categories can be conceptualized in a number of ways, but an antecedent/consequence approach focuses on instructional contexts and teaching activities which result in particular types of pupil events, which in turn, elicit particular teacher responses. The APPLE Information System permits the retrieval of all possible combinations of teacher/pupil observation variables with the relevant frequency counts.

One of our underlying assumptions about teacher performance characteristics in elementary education programs is that the way the teacher organizes instruction determines the extent to which pupils in the classroom learn under the teacher's direction or function independently of the teacher's instruction. We believe that this organizational pattern can affect learning outcomes. We have demonstrated that there are great differences in the ways that reading and mathematics instruction are organized in the second grade, and that both reading and mathematics instruction differ greatly between second grade and fifth grade. Our data show that is unreasonable to specify general teacher performance variables which would uniformly affect reading and mathematics outcomes or that would have comparable applicability for the analysis of instruction across grade levels. Furthermore, predictive validity studies of the relationship between the observation variables and attitude outcomes provide other important findings about teacher performance. Teaching characteristics which affect achievement outcomes positively do not always have a positive relationship to attitude outcomes. We conclude on the basis of the work presented in this report that teacher performance variables and pupil outcomes must be studied by grade level and by specific attitude and achievement outcomes in specific subject areas within grade levels. Furthermore we believe that an adequate study of classroom observation variables must treat groups of variables rather than individual variables as the units of analysis for greatest understanding of teaching-learning patterns.

In order to provide a basis for developing additional hypotheses about observable teacher/pupil classroom characteristics which are associated with greater or less than predicted gains in reading and mathematics, we identified at each grade level and in each subject area the five teachers whose outcomes were better and the five teachers whose outcomes were poorer than would have been predicted by fall test scores. The five top and the five bottom teachers were located by performing regression analyses for second grade reading outcomes, second grade mathematics outcomes, fifth grade reading outcomes and fifth grade mathematics outcomes. (Volume I describes the procedures used to identify the teachers for the crosstabulations. As reported in Volume I, however, there is a discrepancy between the number of teachers identified. While the top and bottom ten teachers were used for the analyses of Volume I, we chose instead to do our analyses with only the top and bottom five. This choice should not lead to contradictory results, however, since selection of the five most extreme rather than ten should make more pronounced any differences observed between the groups of teachers.) Table 65 presents the distribution of the combined second and fifth grade top and bottom teachers with respect to SES and location. The reader will observe that the classrooms of the top and bottom teachers were distributed over all locations and over all SES levels with the exceptions that there were no top performing classrooms in the low/low-middle class suburban areas, and no top performing classrooms in middle SES rural locations. Overall then, we can be satisfied that the classrooms with better and poorer than predicted outcomes were distributed across a wide variety of schools and were not associated with a particular SES level or geographic location. We can now proceed with the review of the findings with respect to teacher/ pupil interaction analyses. In the review to be presented, we will not detail all of the possible crosstabulations of categories in our discussion. Instead we will illustrate, using the example of second grade reading, the ways in which a reader might use the crosstabulation tables to develop hypotheses about classroom (teacher) performance.

Crosstabulations of instructional contexts and teacher activities using the example of second grade reading. We will first examine data which test the assumption that teacher and pupil behaviors in different instructional contexts provide performance data of potential validity for analyzing outcomes in second grade reading. Table 66 presents the crosstabulation of teacher activities and instructional

Table 65

Distribution of Classrooms with Better than and Poorer than Predicted Outcomes in Reading and Mathematics

	SES						
	Low - Low-Middle		Middle		Middle-High - High		
Location	Top	Bottom	Top	Bottom	Top	Bottom	
Rural	3	2	0	4	1	1	11
Suburban	0	2	2	3	4	2	13
Urban	2	2	4	3	4	1	16
Total	5	6	6	10	9	4	40

contexts. A brief explanation about how this table is organized will aid the reader in understanding how this specific table was interpreted and will also provide a guide for interpreting subsequent tables. Reference to the column percents provides information as to how top and bottom teachers differ with respect to the frequency of contexts associated with a particular teacher activity. As an example, take the activity "Circulating" from Table 66. Note that for the top teachers two contexts are observed when the "Circulating" activity is seen ("I-Class" in 85.7% of the instances and "I-Individual" in the remaining 14.3%). For the bottom teachers the activity never occurs, regardless of context. Similarly, reference to the row percents shows how the top and bottom teachers differ with respect to the frequency of activities observed with a particular context. For example, take the "A-Group" context. The percents associated with the teacher activities observed for the top teachers in the "A-Group" context are: 11.1% for "Academic Organizing", 2.2% for "Instruction Giving" and 86.7% for "Working With". For the bottom teachers, three of the 15 activities (two of which were the same as for the top teachers) occur within the "A-Group" context. The "Percent Column Totals" indicate percentage occurrence of each activity compared with all others, regardless of context, and the "Percent Row Totals" show percentage occurrence of each context compared with all others, irrespective of teacher activity.

Having given examples to illustrate the basic organization and use of these crosstabulation tables, we now proceed to discuss the important hypotheses generated. In the first table presented (Table 66), the "Teacher-Group" context and the "Adult-Group" context are more frequently observed in the classrooms of the teachers in the top

Table 66

Frequencies of Teacher Activities in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Reading

Contexts		Teacher Activities Academic Organizing		Answering		Asking		At Board		At Desk		Checking		Circulating		Teacher Activities Discussing		Explaining		Helping		Instruction Giving		Listening		Question & Answer		Supervising		Work With		Percent Row Total
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top	16.1	11.1																			6.7	2.2							11.9	86.7	8.2
	Bottom	*7.7*	*11.1*			*33.3*	*22.2*																							*4.7*	*66.7*	*5.1*
I-Class	Top	6.5	7.4			5.0	11.1					22.9	29.6	85.7	22.2					40.0	7.4	6.7	3.7					25.0	3.7	1.2	14.8	5.0
	Bottom	*23.1*	*15.0*	*100.0*	*35.0*															*37.5*	*30.0*									*3.1*	*20.0*	*11.4*
I-Group	Top	41.9	7.9			1.7	.6					31.4	6.7					20.0	1.2			6.7	.6	21.1	2.4					40.4	80.6	30.6
	Bottom	*7.7*	*1.3*			*16.7*	*1.3*																							*59.8*	*97.4*	*44.3*
I- Individual	Top	3.2	4.0									17.1	24.0	14.3	4.0															5.2	68.0	4.6
	Bottom																													*2.4*	*100.0*	*1.7*
I- Class	Top	19.4	14.6			25.0	36.6					2.9	2.4			11.1	2.4	30.0	7.3			13.3	4.9	5.3	2.4	7.1	2.4	50.0	4.9	2.7	22.0	7.6
	Bottom					*16.7*	*6.7*													*43.8*	*46.7*	*75.0*	*20.0*					*100.0*	*6.7*	*2.4*	*20.0*	*8.8*
T-Group	Top	12.9	1.7			68.3	17.3	100.0	.8			25.7	3.8			88.9	3.4	50.0	2.1	60.0	1.3	66.7	4.2	73.7	5.9	92.9	5.5	25.0	.4	38.6	53.6	43.9
	Bottom	*61.5*	*15.7*			*33.3*	*3.9*													*18.8*	*5.9*	*25.0*	*2.0*	*10.0*	*2.0*	*100.0*	*2.0*			*27.6*	*68.6*	*28.7*
Percent Column Totals	Top	5.7				11.1		.4				6.5		1.3		1.7		1.9		.9		2.8		3.5		2.6		.7		60.9		
	Bottom	*7.4*		*4.0*		*3.4*														*9.1*		*2.3*		*.6*		*.6*		*.6*		*72.2*		

group, while the "Independent-Group" context is less frequently observed. We have already pointed out that the "Teacher-Group" and "Independent-Group" contexts are the most common instructional modes for second grade reading. However, the table shows that the top teachers, along with other adults in the class, are responsible for instruction in over 50 percent of all of the target pupil events. The next question asks: Do teacher activities in different contexts vary between the top and bottom teachers? Table 66 illustrates the important finding that the top teachers use a greater variety of teaching activities than the bottom teachers, and that there are resultant differences in the relative frequencies of these activities. The "Working With" activity is most frequent for both groups of teachers, but the top teachers are observed more frequently working with pupils than are the bottom teachers. When top teachers "Work With" pupils, the "Independent-Group" and "Teacher-Group" contexts are equally dominant as instructional patterns while the bottom teachers "Work With" pupils predominantly when the pupils are organized independently in groups. Teachers of pupils with poorer than predicted outcomes are observed helping pupils more, spending more time organizing the lesson, and answering questions more often. Teachers of pupils with better than predicted scores are observed more frequently asking questions, checking pupils' work, giving instructions, listening, and conducting question and answer sessions.

Crosstabulations of instructional contexts and pupil events using the example of second grade reading. Pupil behavior is also observed to vary with respect to contexts. Pupils in the top teachers' classes have more observable reading events (see Table 67), such as "+ Oral Reading", "+ Phonics Skills" and "+ Reading Comprehension". "+ Oral

Table 67

Frequencies of Pupil Events within Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Reading

Contexts	Teacher Group	Pupil Events																		Pupil Events																Percent Row Total
		+ Academic Performance		+ Attentiveness		+ Direction Following		+ Engagement		+ Participation		+ Volunteering		+ Work Habits		- Conduct		- Inattention		- Talking		0 Conduct		0 Engagement		0 Inattention		0 Work Habits		+ Oral Reading		+ Phonic Skills		+ Reading Comprehension		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top	26.1	18.2	8.3	6.1			3.6	12.1	16.7	6.1	18.2	6.1	7.7	6.1			13.0	9.1			16.7	6.1							1.6	3.0	21.9	21.2	8.7	6.1	7.4
	Bottom	8.3	33.3	14.3	33.3																	33.3	33.3													2.0
I-Class	Top	4.3	4.3			11.1	8.7	4.5	21.7					15.4	17.4	6.3	4.3	13.0	13.0	28.6	8.7	16.7	8.7					16.7	13.0							5.2
	Bottom	25.0	12.5					19.4	25.2					10.7	22.5	40.0	8.3	11.1	4.2	57.2	16.7	33.3	4.5	10.0	4.2			28.6	8.3							15.8
I-Group	Top	8.7	1.4	16.7	2.8	5.6	.7	70.3	54.2					42.3	7.6	12.5	1.4	30.4	4.9	57.1	2.8	25.0	2.1	75.0	4.2	58.8	6.9	33.3	4.2	6.5	2.8	15.6	3.5	4.3	.7	32.5
	Bottom	8.3	1.4			50.0	5.6	65.8	34.7					67.9	26.4	20.0	1.4	77.8	8.7	42.9	4.2	33.3	1.4	70.0	9.7			42.9	4.2			25.0	1.4			47.4
I-Individual	Top							12.6	63.6					11.5	13.6			4.3	4.5					12.5	4.5			11.1	9.1			3.1	4.5			5.0
	Bottom							2.8	33.3					7.1	66.7																					2.0
T- Class	Top	4.3	3.4	25.0	20.7	5.6	3.4	1.8	6.9	8.3	3.4	9.1	3.4	3.8	3.4	18.8	10.3	4.3	3.4	14.3	3.4	16.7	6.9			17.6	10.3	5.6	3.4	3.2	6.9			13.0	10.3	6.5
	Bottom			42.9	21.4	12.5	7.1	5.3	14.3	16.7	7.1			3.6	7.1	40.0	14.3											28.6	14.3	20.0	7.1			33.0	7.1	9.2
T-Group	Top	56.5	6.8	50.0	6.3	77.8	7.3	7.2	4.2	75.0	4.7	72.7	4.2	19.2	2.6	62.5	5.2	34.8	4.2			25.0	1.6	12.5	.5	23.5	2.1	33.3	3.1	88.7	28.6	59.4	9.9	73.9	8.9	43.3
	Bottom	58.3	19.4	42.9	8.3	37.5	8.3	7.9	8.3	83.3	13.9			10.7	8.3			11.1	5.6					20.0	5.6					80.0	11.1	75.0	8.3	66.7	5.6	23.7
Percent Column Total	Top	5.2		5.4		4.1		25.1		2.7		2.5		5.9		3.6		5.2		1.6		2.7		1.8		3.8		4.1		14.0		7.2		5.2		
	Bottom	7.9		4.6		5.3		25.0		3.9				18.4		3.3		5.9		4.6		2.0		6.6				4.6		3.3		2.8		2.0		

Reading" occurs more in the "Teacher-Group" context than in any other context. "+ Phonics Skills" are observed for both groups of teachers in the "Independent-Group" and "Teacher-Group" contexts, but "+ Phonics Skills" are observed only for the top teachers in the "Adult-Group" and the "Independent-Individual" contexts. It is of interest that there are no reading performance events observed with adults leading the instruction in the bottom teachers' classes. Pupils in the bottom teachers' classes are more often seen manifesting general academic skills, following directions, and demonstrating good work habits than are pupils in classes of the top teachers. The two groups of classrooms appear to differ with respect to the extent of teacher management of instruction, the variety of classroom activities, and evidence of reading skill learning. Of considerable importance is the finding that top and bottom teachers do not differ with respect to the frequency of observed negative pupil behavior. In fact, pupils in the top performing teachers' classes manifest slightly more negative behavior when the frequencies of "- Conduct," "- Inattention," and "- Talking" events are combined.

Crosstabulations of instructional contexts and teacher responses using the example of second grade reading. Table 68 shows that the bottom teachers more frequently fail to respond to pupil behaviors than do the top teachers, though "None" is the most frequently observed teacher response to pupil behavior over all classrooms. The bottom teachers use "Discipline" more often than the top teachers, use more "Praise", and employ a smaller variety of teacher responses. Top teachers employ more interactive types of management such as "Instructing," "Questioning," "Recognizing," and "Redirecting" across the several contexts.

Table 68

Frequencies of Teacher Responses in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Reading

Contexts		Teacher Pesponses														Teacher Responses												Percent Row Total
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top			7.7	1.9									13.7	94.3							5.6	1.9	3.6	1.9	9.2
	Bottom													*6.8*	*100.0*											*4.3*
I-Class	Top	11.8	13.3			7.1	3.3							5.2	63.3	4.5	6.7			4.8	3.3			10.7	10.0	5.2
	Bottom			*25.0*	*8.0*	*25.0*	*9.0*							*15.0*	*80.0*	*7.1*	*4.0*							*33.3*	*4.0*	*13.6*
I-Group	Top	11.8	2.3	53.8	4.0	14.3	1.1	10.0	.6					40.9	84.2	4.5	1.1			4.8	.6	11.1	1.1	32.1	5.1	30.9
	Bottom	*44.4*	*5.1*	*62.5*	*6.3*	*25.0*	*1.3*							*48.1*	*81.0*	*14.3*	*2.5*	*11.1*	*1.3*	*100.0*	*1.3*			*33.3*	*1.3*	*42.9*
I-Individual	Top	2.9	3.8											6.3	88.5									7.1	7.7	4.5
	Bottom	*11.1*	*33.3*											*1.5*	*66.7*											*1.6*
T-Class	Top	2.9	2.2	15.4	4.4			10.0	2.2			60.0	6.7	8.0	64.4	6.8	6.7			4.8	2.2	11.1	4.4	10.7	6.7	7.9
	Bottom													*8.3*	*78.6*			*11.1*	*7.1*			*100.0*	*14.3*			*7.6*
T-Group	Top	70.6	9.9	23.1	1.2	78.6	4.5	80.0	3.3	100.0	2.9	40.0	.8	25.8	38.8	84.1	15.3	100.0	6.2	85.7	7.4	72.2	5.4	35.7	4.1	42.2
	Bottom	*44.4*	*7.4*	*12.5*	*1.9*	*50.0*	*3.7*			*100.0*	*1.9*			*20.3*	*50.0*	*78.6*	*20.4*	*77.8*	*13.0*					*33.3*	*1.9*	*29.3*
Percent Column Total	Top	5.9		2.3		2.4		1.7		1.2		.9		63.5		7.1		2.6		3.7		3.1		4.9		
	Bottom	*4.9*		*4.3*		*2.2*				*.5*				*72.3*		*7.6*		*4.9*		*.5*		*1.1*		*1.6*		

Crosstabulations of pupil events and teacher activities using the example of second grade reading. The path analysis proposed for conceptualizing the relationship between teacher performance variables and pupil outcomes postulates that teacher activities generate pupil behaviors and pupil behaviors generate teacher responses. While each of these categories of variables may be considered aspects of teacher performance, the feasibility of using this conceptual model to analyze the reciprocal relationship between teacher and pupil behavior is supported by the crosstabulation of teacher activities and pupil events presented here and the cross tabulation of pupil events and teacher responses to be discussed below. Table 69 provides comparative information about the teaching activities in which reading skills are most evident. In the classes of the top teachers, pupil events in "+ Oral Reading" occur in academic organization activities, in response to teachers asking questions, during discussions and while teachers are listening, as well as in sessions in which teachers are working with pupils. On the other hand, all of the "+ Oral Reading" events in the bottom teachers' classes occur during "Work With" activities. A similar distribution of "+ Skills" events occur across instructional activities for the top performing teachers, while all of the phonics events in the bottom teachers' classes were again in the "Work With" activity. Second grade teachers whose pupils showed better than predicted achievement in reading utilize pupils' reading skills in many more types of instructional activities than do teachers whose pupils have lower than expected achievement outcomes.

The overall frequency of "+ Engagement" events is similar for both the top and bottom teachers. However, in activities other than

Table 69

Frequencies of Pupil Events within Teacher Activies for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Reading

		PUPIL EVENTS																																			
		+ Academic Performance		+ Attentiveness		Direction Following		+ Engagement		+ Participation		+ Volunteering		+ Work Habits		- Conduct		- Inattention		- Talking		0 Conduct		0 Engagement		0 Inattention		0 Work Habits		+ Oral Reading		+ Phonic Skills		+ Reading Comprehension		
TEACHER ACTIVITY	Teacher Group	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Percent Row Total
Academic Organizing	Top	4.5	5.6	5.0	5.6	20.0	16.7	1.9	11.1			9.1	5.6	8.7	11.1			14.3	16.7			9.1	5.6			6.3	5.6	5.0	5.6	1.7	5.6	3.8	5.6			4.4
	Bottom	30.0	37.5					9.1	37.5	16.7	12.5											33.3	12.5													2.7
[illegible]	Top																																			0
	Bottom							9.1	50.0											40.0	50.0															4.3
Asking	Top	27.3	14.3			40.0	14.3	1.0	2.4	8.3	2.4					12.5	4.8	4.8	2.4			9.1	2.4			18.8	7.1	10.0	4.8	13.6	19.0	15.4	9.5	30.4	16.7	10.2
	Bottom									33.3	66.7																							50.0	33.3	3.1
At Board	Top											9.1	50.0			6.3	50.0																			.5
	Bottom																																			0
At Desk	Top																																			0
																																				0
[illegible]								12.5	44.8					17.4	13.8	6.3	3.4	14.3	10.3									20.0	13.8			3.8	3.4	13.0	10.3	7.1
																																				0
Circulating	Top							1.9	40.0					4.3	20.0					40.0	40.0															1.2
	Bottom																																			0
Discussing	Top			5.0	16.7					16.7	33.3							4.8	16.7											3.4	33.3					1.5
	Bottom																																			0
Explaining	Top			7 5.0	12.5	13.3	25.0									18.8	37.5									6.3	12.5					3.8	12.5			2.0
	Bottom																																			0
Helping	Top																					9.1	33.3					5.0	33.3			3.8	33.3			.7
	Bottom							6.1	15.4					18.5	38.5	60.0	23.1			14.3	7.7							22.2	15.4							9.3
Instruction Giving	Top					13.3	25.0	1.9	25.0													18.2	25.0									3.8	12.5	4.3	12.5	2.0
	Bottom			50.0	60.0											20.0	20.0					33.3	20.0													3.6
Listening	Top																	9.5	11.8	40.0	11.8									22.0	76.5					4.1
	Bottom									16.7	100.0																									.7
Question & Answer	Top	4.5	10.0							8.3	10.0	18.2	20.0			31.3	50.0																	4.3	10.0	2.4
	Bottom																	11.1	100.0																	.7
Supervising	Top							2.9	100.0																											.7
	Bottom																																			0
Don't Watch	Top	63.6	5.4	85.0	6.6	13.3	.8	77.9	31.3	66.7	3.1	63.6	2.7	69.6	6.2	25.0	1.5	52.4	4.2	20.0	.4	54.5	2.3	100.0	2.3	68.8	4.2	60.0	4.6	59.3	13.5	65.4	6.6	47.8	4.2	63.2
	Bottom	70.0	6.8	50.0	2.9	100.0	3.9	75.8	24.2	33.3	1.9			81.5	21.4	20.0	1.0	88.9	7.8	42.9	2.9	33.3	1.0	100.0	9.7			77.8	6.8	100.0	4.9	100.0	3.9	50.0	1.0	73.6
Percent	Top	5.4		4.8		3.7		25.4		2.9		2.7		5.6		3.9		5.1		1.2		2.7		1.5		3.9		4.9		14.4		6.3		5.6		

"Work With", being engaged in the learning task was observed to be present when the top teachers were "Asking" questions, "Checking" pupil work, "Circulating" around the room and "Supervising". The "+ Engagement" events for the bottom teachers were observed instead in "Academic Organizing", "Answering" questions, and "Helping" activities. Pupils are engaged in the top teachers' classes when the teachers are actively involved in instruction. In the bottom classes pupil engagement is observed in teaching activities associated with introducing, conducting the lesson, and helping pupils who are having difficulties.

Additional evidence of more active pupil participation and greater diversity of teacher activities among the top teachers can be noted in the "+ Volunteering" events. There are no "+ Volunteering" events observed in the bottom teachers' classes, while a small portion of the total observed pupil events in the top classes are "+ Volunteering". These events are observed most frequently in the "Work With" activity, but they also occur in "Academic Organizing", "Asking", and in "Question and Answer" sessions. These data contrasting teacher activity/pupil event combinations suggest the important hypothesis that crucial second grade teacher performances are engaging the active participation of the pupils in reading lessons and integrating a variety of teacher activities into reading instruction.

The validity studies of teacher activities in second grade reading reported significant correlations with reading achievement over all BTES classrooms as a group (see Table 40). The data showed that "Academic Organizing" and "Asking" are negatively correlated with some measures of reading achievement outcomes. By using the crosstabulation of teacher activities and pupil events, we can point out some of the possible explanations for these negative relationships. The percent of "Academic Organizing" activities is slightly higher for the poor teachers than for the good teachers. However, there were more "Asking" activities for the good teachers. By examining each of the pupil events observed within the "Academic Organizing" activity we see that the pupil events in the bottom teachers' classes are "+ Academic Performance", "+ Engagement", "+ Participation", and "0 Conduct". The effectiveness of the top performing teachers in using "Academic Organizing" time is amply shown by the incidence of pupil events in the categories "+ Academic Performance", "+ Attentiveness", "+ Direction Following", "+ Engagement", "+ Volunteering", "+ Work Habits", "+ Oral Reading", and "+ Phonic Skills" as well as the frequent occurrences of "- Inattention", "0 Conduct", "0 Innattention", and "0 Work Habits". The considerably larger proportion of "Asking" activities for the top teachers is contrary to the findings for the second grade teachers as a group, for which the correlation of this activity with outcome was negative. Nevertheless, we can postulate that when "Asking" is accompanied by active pupil responses, such as "+ Direction Following" and "+ Volunteering", the effect on outcome may be positive.

Crosstabulations of pupil events and teacher responses using the example of second grade reading. Nearly everyone would expect that teachers with the best reading achievement outcomes would have few, if any behavior problems in their classes, especially during reading. The crosstabulations of pupil events and teacher responses (Table 70) show that there are at least equivalent frequencies of classroom behavior problems as reflected in "- Conduct and "- Inattention". The crosstabulations may suggest why the incidence of negative pupil behavior is not related to reading achievement outcomes in the top teachers' classes. Earlier we pointed out that there were

Table 70

Frequencies of Teacher Responses Associated with Pupil Events for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Reading

		TEACHER RESPONSES																								
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		Percent Row Total
PUPIL EVENTS	Teacher Group	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
+ Academic Performance	Top					12.5	4.3							3.8	47.8	13.5	21.7	14.3	8.7	18.8	13.0	14.3	4.3			5.2
	Bottom			[illegible]	[illegible]									4.5	41.7	36.4	33.3	33.3	16.7							[illegible]
+ Attentiveness	Top	11.5	12.0			12.5	4.0							6.8	80.0					6.3	4.0					5.7
	Bottom													5.4	100.0											3.1
+ Direction Following	Top	11.5	16.7			12.5	5.6							4.1	66.7					12.5	11.1					4.1
	Bottom													6.3	87.5							50.0	12.5			[illegible]
+ Engagement	Top	7.7	1.8											35.8	92.1	2.7	.9	7.1	.9			14.3	.9	19.0	3.5	26.0
	Bottom	16.7	[illegible]			50.0	2.9							33.5	94.3											[illegible]
+ Participation	Top							16.7	9.1					2.7	72.7	5.4	18.2									2.5
	Bottom	[illegible]	16.7											[illegible]	50.0	9.1	16.7					50.0	16.7			[illegible]
+ Volunteering	Top							16.7	12.5					1.0	37.5	2.7	12.5			6.3	12.5	14.3	12.5	4.8	12.5	1.8
	Bottom																									0
+ Work Habits	Top													8.5	96.2	2.7	3.8									5.9
	Bottom	[illegible]	[illegible]			50.0	3.8							22.3	[illegible]											[illegible]
Conduct	Top							16.7	6.3			100.0	31.3	1.0	18.8									33.3	43.8	3.6
	Bottom			[illegible]	[illegible]									2.7	75.0											[illegible]
Distraction	Top			20.0	4.3			16.7	4.3	100.0	4.3			4.8	60.9	2.7	4.3							23.8	21.7	5.2
	Bottom													[illegible]	100.0											[illegible]
[illegible]	Top			60.0	42.9									.3	14.3									14.3	42.9	1.6
	Bottom			[illegible]	28.6									3.6	57.2									50.0	14.3	[illegible]
Conduct	Top	3.8	8.3					33.3	16.7					2.4	58.3					6.3	8.3	14.3	8.3			2.7
	Bottom													2.7	75.0									[illegible]	[illegible]	[illegible]
N Engagement	Top													2.4	87.5					6.3	12.5					1.8
	Bottom	[illegible]	[illegible]											1.4	75.0											[illegible]
Inattention	Top	3.8	5.9											5.1	88.2									4.8	5.9	3.9
	Bottom																									0
Work Habits	Top	[illegible]	11.1											5.1	83.3					6.3	5.6					4.1
	Bottom			[illegible]	[illegible]									6.3	77.8					100.0	11.1					[illegible]
+ Oral Reading	Top	38.5	15.9	20.0	1.6	50.0	6.3							7.8	36.5	37.8	[illegible]	35.7	7.9	25.0	6.3	28.6	3.2			14.4
	Bottom															27.3	60.0	33.3	40.0							[illegible]
+ Phonic Skills	Top	3.8	3.4			12.5	3.4							5.8	58.6	16.2	20.7	28.6	13.8							6.6
	Bottom													[illegible]	[illegible]	9.1	[illegible]	33.3	50.0							[illegible]
+ Reading Comprehension	Top	11.5	14.3											2.4	33.3	16.2	28.6	14.3	9.5	12.5	9.5	14.3	4.8			4.8
	Bottom															18.2	100.0									1.4
Percent Column Total	Top	5.9		1.1		1.8		1.4		.2		1.1		66.7		8.4		3.2		3.6		1.6		4.8		
	Bottom	4.2		3.4		1.4		[illegible]		[illegible]		[illegible]		76.5		[illegible]		4.1		.3		1.4		1.4		

a greater variety of teacher responses in the top classes. Table 70 provides clear evidence that there are not only a greater variety of teacher responses, but that top teachers' responses to particular types of negative pupil behavior vary as well. The top teachers respond to "- Conduct" pupil behavior with "Ignoring", "Negative Feedback", "None" and "Redirecting". In the bottom performing classes, teachers respond to this behavior with "Disciplining" and "None". Inappropriate pupil behavior is common to all classrooms. Top scoring teachers presumably do not disrupt their teaching to discipline an inappropriately behaving pupil. They maintain control of the situation by ignoring the pupil and moving on with the lesson.

Teacher responses such as "Positive Feedback", "Instructing", and "Redirecting" were also related to achievement and attitude outcomes. However, the relationships were both positive and negative. Consequently, one must return to the data such as that reported on these tables to understand the interrelationship between pupil and teacher variables as combined predictors of outcomes.

This explication of the crosstabulation data for the second grade teachers with the top and bottom outcomes in reading achievement has been offered to show the reader one way that the wealth of data collected in the APPLE naturalistic observation system might be used. Tables reporting similar results for second grade teachers with the best and poorest mathematics outcomes follow (Tables 71-75), along with tables reporting the data for the top and bottom scoring fifth grade teachers in reading (Tables 76-80) and in mathematics (Tables 81-85). From a careful review of all of the cells in which interactive data are available, a future task will be to identify the frequently occuring teacher activity/pupil event combinations and pupil event/teacher response combinations and to use them as independent variables in the prediction of pupil outcomes. The APPLE Observation System categorizes naturalistic observations and provides data which, when analyzed as category data, can produce an initial screening of the most salient classroom variables from which to infer teacher performance characteristics. The tables reporting the crosstabulations are excellent evidence for the fact that many of the critical teacher performance characteristics are not identified by tallies of the overall frequency of their occurrence. Only when teacher activity variables are analyzed with respect to the consequent pupil behavior and the subsequent teacher behavior is it possible to understand differences between teachers with the best and poorest outcomes in particular achievement areas.

Table 71

Frequencies of Teacher Activities in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Mathematics

Contexts		Teacher Activities																Teacher Activities														Percent Row Total
		Academic Organizing		Answering		Asking		At Board		At Desk		Checking		Circulating		Discussing		Explaining		Helping		Instruction Giving		Listening		Question & Answer		Supervising		Work With		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top	10.0	40.0																											2.9	60.0	1.6
	Bottom													*4.3*	*14.3*									*100.0*	*28.6*					*6.6*	*57.1*	*2.9*
I-Class	Top			100.0	21.4							8.0	3.6	22.8	32.1					63.2	21.4									11.4	21.4	18.2
	Bottom											*16.4*	*16.4*	*69.6*	*29.1*					*81.5*	*40.0*	*6.7*	*1.8*					*87.5*	*12.7*			*23.0*
I-Group	Top	5.0	1.3									4.0	1.3	30.4	31.2			33.3	5.2	31.6	7.8					50.0	1.3			38.1	51.9	25.0
	Bottom	*33.3*	*2.7*					*5.6*	*2.7*			*5.4*	*5.4*					*4.8*	*2.7*	*14.8*	*10.8*	*20.0*	*8.1*							*41.0*	*67.6*	*15.5*
I- Individual	Top	5.0	2.8									56.0	38.9	11.4	25.0															11.4	33.3	11.7
	Bottom																			*3.7*	*100.0*											*.4*
T- Class	Top	55.0	10.1			100.0	8.3	100.0	12.8			32.0	7.3	35.2	25.7			25.0	2.8	5.3	.9	83.3	4.6			50.0	.9	100.0	4.6	22.9	22.0	35.4
	Bottom	*66.7*	*1.5*			*87.5*	*21.5*	*88.9*	*12.3*			*57.7*	*11.5*	*26.1*	*4.6*	*100.0*	*2.3*	*95.2*	*15.4*			*53.3*	*6.2*					*12.5*	*.8*	*50.8*	*23.8*	*54.4*
T-Group	Top	25.0	20.0															41.7	20.0			16.7	4.0							13.3	56.0	8.1
	Bottom					*12.5*	*44.4*	*5.6*	*11.1*													*20.0*	*33.3*							*1.6*	*11.1*	*3.8*
Percent Column Totals	Top	6.5		3.9		2.9		4.5				8.1		25.6				3.9		6.2		1.9				.6		1.6		34.1		
	Bottom	*1.3*				*13.4*		*7.5*				*10.9*		*9.6*		*1.3*		*8.8*		*11.3*		*6.3*		*.8*				*3.3*		*25.5*		

Table 72

Frequencies of Pupil Events within Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Mathematics

Contexts	Teacher Group	Pupil Events																		Pupil Events																Percent Row Total
		+ Academic Performance		+ Attentiveness		+ Direction Following		+ Engagement		+ Participation		+ Volunteering		+ Work Habits		- Conduct		- Inattention		- Talking		0 Conduct		0 Engagement		0 Inattention		0 Work Habits		+ Number Concepts		- Number Concepts		0 Number Concepts		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top							4.0	40.0																					5.8	60.0					2.0
	Bottom							13.0	100.0																											1.5
I-Class	Top							34.0	45.9					14.7	13.5			27.8	13.5	25.0	10.8							13.6	8.1	3.8	5.4	20.0	2.7			14.7
	Bottom							28.1	14.0					40.7	25.6			27.3	7.0	40.0	4.7			100.0	2.3			63.6	16.3	17.9	16.3	40.0	9.3	33.3	4.7	22.1
I-Group	Top							30.0	23.1					35.3	18.5	50.0	3.1	27.8	7.7	37.5	9.2	100.0	4.6	20.0	1.5	20.0	1.5	31.8	10.8	11.5	9.2	40.0	3.1	50.0	7.7	25.8
	Bottom					25.0	9.4	43.8	31.3					22.2	18.8	50.0	6.3	27.3	9.4	20.0	3.1							27.3	9.4	7.7	9.4	10.0	3.1			16.4
I-Individual	Top	100.0	6.9					12.0	20.7					20.6	24.1			11.1	6.9							40.0	6.9	31.8	24.1	5.8	10.3					11.5
	Bottom																																			
T- Class	Top			72.2	13.0	100.0	2.0	18.0	9.0	66.7	2.0	100.0	3.0	29.4	10.0	50.0	2.0	16.7	3.0	31.3	5.0			80.0	4.0	40.0	2.0	18.2	9.0	67.3	35.0	40.0	2.0	40.0	4.0	39.7
	Bottom	100.0	1.0	72.2	12.4	75.0	8.6	17.4	3.8	80.0	7.6	100.0	11.4	18.5	4.8	50.0	1.9	45.5	4.8	40.0	1.9	100.0	2.9			100.0	1.9	9.1	1.0	74.4	27.6	50.0	4.8	66.7	3.8	53.8
T-Group	Top			27.8	31.3			2.0	6.3	33.3	6.3							16.7	18.8	6.3	6.3							4.5	6.3	5.8	18.8			10.0	6.3	6.3
	Bottom			27.8	41.7					20.0	16.7			18.5	41.7																					6.2
Percent Column Total	Top	.8		7.1		.8		19.8		1.2		1.2		13.5		1.6		7.1		6.3		1.2		2.0		2.0		8.7		20.6		2.0		4.0		
	Bottom	.5		9.2		6.2		11.8		5.2		6.2		13.8		2.1		5.6		2.6		1.5		.5		1.0		5.6		20.0		5.1		3.1		

Table 73

Frequencies of Teacher Responses in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Mathematics

Contexts		Teacher Responses														Teacher Responses										Percent Row Total
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top													2.1	100.0											1.6
	Bottom													*3.9*	*100.0*											*2.8*
I-Class	Top	22.2	4.0			20.0	4.0	12.5	2.0			100.0	2.0	17.6	84.0			20.0	2.0					6.3	2.0	15.8
	Bottom					*55.6*	*7.7*					*50.0*	*1.5*	*28.3*	*78.5*	*7.7*	*1.5*					*42.9*	*4.6*	*40.0*	*6.2*	*25.7*
I-Group	Top	22.2	2.4	33.3	1.2	10.0	1.2	62.5	5.9					28.5	80.0			20.0	1.2			20.0	1.2	37.5	7.1	26.9
	Bottom	*11.1*	*2.6*			*11.1*	*2.6*	*15.4*	*5.1*					*17.8*	*82.1*	*15.4*	*5.1*							*100.0*	*2.6*	*15.4*
I-Individual	Top	22.2	5.7			20.0	5.7							11.3	77.1			20.0	2.9					18.8	8.6	11.1
	Bottom													*.6*	*100.0*											*.4*
T-Class	Top	33.3	2.5	33.3	.8	40.0	3.4	12.5	.8	100.0	.8			34.3	69.5	87.5	11.9	40.0	1.7	100.0	2.5	80.0	3.4	18.8	2.5	37.3
	Bottom	*55.6*	*3.9*	*100.0*	*2.3*	*33.3*	*2.3*	*84.6*	*8.5*	*100.0*	*.8*	*50.0*	*.8*	*44.4*	*62.0*	*76.9*	*7.8*	*100.0*	*3.1*	*100.0*	*1.6*	*57.1*	*3.1*	*50.0*	*3.9*	*51.0*
T-Group	Top			33.3	4.3	10.0	4.3	12.5	4.3					6.3	65.2	12.5	8.7							18.8	13.0	7.3
	Bottom	*33.3*	*25.0*											*5.0*	*75.0*											*4.7*
Percent Column Total	Top	2.8		.9		3.2		2.5		.3		.3		75.6		5.1		1.6		.9		1.6		5.1		
	Bottom	*3.6*		*1.2*		*3.6*		*5.1*		*.4*		*.8*		*71.1*		*5.1*		*1.6*		*.8*		*2.8*		*4.0*		

Table [illegible]

Frequencies of Pupil Events within Teacher Activities for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Mathematics

TEACHER ACTIVITY	Teacher Group	Academic Performance		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		Number Concepts		[illegible]		[illegible]		Percent Row Total
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
Academic Organizing	Top					100.0	6.7	20.9	60.0															80.0	26.7									9.1	6.7	6.5
	Bottom							4.3	100.0																											[illegible]
Answering	Top							18.6	72.7					3.2	9.1			5.6	9.1									4.8	9.1							4.8
	Bottom																																			[illegible]
Asking	Top											100.0	37.5													25.0	12.5			8.7	50.0					3.5
	Bottom	100.0	4.3	20.0	13.0					20.0	8.7	33.3	17.4	16.7	17.4	33.3	4.3													12.5	[illegible]	37.5	13.0			[illegible]
At Board	Top			40.0	54.5					33.3	9.1					25.0	9.1													2.2	9.1	25.0	9.1	9.1	9.1	4.8
	Bottom			26.7	33.3	8.3	8.3			10.0	8.3									20.0	8.3	25.0	8.3					[illegible]	8.3	5.6	16.7			33.3	8.3	[illegible]
At Desk	Top																																			0
	Bottom																																			0
Checking	Top	50.0	4.3					11.6	21.7					15.2	21.7			11.1	8.7	7.1	4.3					25.0	4.3	14.3	13.0	10.9	21.7					10.0
	Bottom					50.0	25.0	4.3	4.2					39.2	29.2			9.1	4.2											18.4	29.2	33.3	4.2			12.1
Circulating	Top	50.0	1.9					11.6	9.6					39.4	25.0			27.8	9.6	21.4	5.8					25.0	1.9	38.1	15.4	19.6	17.3	50.0	3.8	45.5	9.6	22.6
	Bottom							13.3	18.8					4.2	4.2			27.3	18.8	20.0	6.2			100.0	6.2			[illegible]	6.2	22.2	[illegible]	[illegible]	6.2	[illegible]	[illegible]	[illegible]
Discussing	Top																																			0
	Bottom			13.3	66.7																									5.6	33.3					1.7
Explaining	Top			33.3	55.6															7.1	11.1							9.5	22.2					9.1	11.1	3.9
	Bottom			6.7	10.0							25.0	30.0			33.3	10.0	27.2	30.0											5.6	10.0					[illegible]
Helping	Top			6.7	8.3			4.7	16.7					6.1	16.7			11.1	16.7	21.4	25.0	33.3	8.3					4.8	8.3							5.2
	Bottom							26.1	37.5					12.5	18.8													[illegible]	31.8	5.6	6.2	33.3	6.2			[illegible]
Instruction Giving	Top															25.0	25.0	11.1	50.0	7.1	25.0															1.7
	Bottom			6.7	7.7	8.3	7.7			10.0	7.7			16.7	23.1			3.1	7.7	20.0	7.7							10.0	23.1	5.6	7.7					[illegible]
Listening	Top																																			0
	Bottom							4.3	100.0																											[illegible]
Question & Answer	Top																																			0
	Bottom																																			
Supervising	Top									33.3	20.0																			6.5	60.0			9.1	20.0	[illegible]
	Bottom							8.7	40.0											33.3	20.0									[illegible]	[illegible]			[illegible]	[illegible]	[illegible]
Work With	Top			20.0	3.7			32.6	17.5	33.3	1.2			36.4	15.0	50.0	2.5	13.3	7.5	35.7	6.3	66.7	2.5	20.0	1.2	25.0	1.2	28.6	7.5	32.2	30.0	25.0	[illegible]	18.2	2.5	[illegible]
	Bottom			26.7	7.4	83.3	[illegible]	33.3	16.7	80.0	[illegible]	41.7	[illegible]	12.5	[illegible]	33.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			100.0	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
Percent Column Total	Top	.9		6.5		.4		18.7		1.3		1.3		14.3		1.7		7.8		6.1		1.3		2.2		1.7		9.1		25.0		[illegible]		4.8		
	Bottom	.6		8.4		6.7		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		

Table 75

Frequencies of Teacher Responses Associated with Pupil Events for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Second Grade Mathematics

		TEACHER RESPONSES																								
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		Perce Row Tota
PUPIL EVENTS	Teacher Group	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
+ Academic Performance	Top	16.7	50.0											.5	50.0											[illegible]
	Bottom																									[illegible]
+ Attentiveness	Top	16.7	5.3											8.7	89.5	5.9	5.3									[illegible]
	Bottom													13.6	100.0											[illegible]
+ Direction Following	Top													1.0	100.0											[illegible]
	Bottom													4.6	91.7	7.7	8.3									[illegible]
+ Engagement	Top													25.1	98.0			20.0	2.0							19.
	Bottom													27.4	100.0											[illegible]
+ Participation	Top													1.5	100.0											1.
	Bottom							11.1	10.0					5.8	90.0											4.
+ Volunteering	Top	16.7	33.3							100.0	33.3			.5	33.3											1.
	Bottom							77.8	63.6					.3	27.3							16.7	9.1			5.
+ Work Habits	Top					25.0	2.9							.4	82.4			40.0	5.9	66.7	5.9			8.3	2.9	13.
	Bottom	[illegible]	14.8											16.7	81.5	7.7	3.7									[illegible]
- Conduct	Top													.5	33.3									16.7	66.7	1.
	Bottom			40.0	25.0			11.1	25.0					1.5	50.0											[illegible]
- Inattention	Top			33.3	5.6	25.0	5.6							6.7	72.2									25.0	16.7	7.
	Bottom													6.1	72.7					50.0	9.1			33.3	18.2	[illegible]
- Talking	Top			66.7	13.3									4.6	60.0									33.3	26.7	6.
	Bottom			60.0	20.0							50.0	20.0	.8	50.0									[illegible]	[illegible]	[illegible]
0 Conduct	Top							100.0	66.7													33.3	33.3			1.
	Bottom													1.5	100.0											[illegible]
0 Engagement	Top													2.6	100.0											[illegible]
	Bottom													.8	100.0											[illegible]
0 Inattention	Top													2.6	100.0											[illegible]
	Bottom													.8	50.0									[illegible]	[illegible]	[illegible]
0 Work Habits	Top	16.7	4.5											9.2	81.8	5.9	4.5							16.7	9.1	[illegible]
	Bottom					33.3	9.1							6.1	72.7							50.0	18.2			[illegible]
+ Number Concepts	Top	16.7	1.9			25.0	1.9							16.4	61.5	82.4	26.9	40.0	3.8	33.3	1.9	33.3	1.9			20.
	Bottom	[illegible]	2.8											12.1	44.4	84.6	30.6	100.0	11.1			50.0	[illegible]			[illegible]
- Number Concepts	Top	16.7	25.0											1.5	75.0											1.
	Bottom	[illegible]	11.1			66.7	22.2			100.0	11.1			2.4	55.6											[illegible]
0 Number Concepts	Top					25.0	9.1							4.1	72.7	5.9	9.1					33.3	9.1			4.
	Bottom	[illegible]	[illegible]									50.0	16.7	2.1	[illegible]					50.0	16.7			16.7	[illegible]	[illegible]
Percent Column Total	Top	2.4		1.2		1.6		.8		.4		0		77.7		6.8		2.0		1.2		1.2		4.8		
	Bottom	[illegible]		2.1		2.6		4.8		.3		2.1		[illegible]		8.9		2.1		1.1		2.8		2.1		

Table 76

Frequencies of Teacher Activities in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Reading

		Teacher Activities													
		Academic Organizing		Answering		Asking		At Board		At Desk		Checking		Circulating	
Contexts		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %
A-Group	Top											10.0	10.0	3.8	10.0
	Bottom														
I-Class	Top									100.0	44.2	60.0	7.8	65.4	22.1
	Bottom	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
I-Group	Top											20.0	4.8	19.2	11.9
	Bottom			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
I- Individual	Top													7.7	40.0
	Bottom									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T- Class	Top	75.0	31.6			22.2	10.5								
	Bottom	[illegible]	[illegible]	[illegible]	[illegible]									[illegible]	[illegible]
T-Group	Top	25.0	3.9			77.8	13.7					10.0	2.0	3.8	2.0
	Bottom	[illegible]	[illegible]			[illegible]	[illegible]							[illegible]	[illegible]
Percent Column Totals	Top	3.9				4.4				16.7		4.9		12.7	
	Bottom	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	

		Teacher Activities																	
		Discussing		Explaining		Helping		Instruction Giving		Listening		Question & Answer		Supervising		Work With			
Contexts		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Percent Row Total	
A-Group	Top					5.3	10.0									12.5	70.0	4.9	
	Bottom																		
I-Class	Top					89.5	22.1	20.0	1.3					20.0	1.3	1.8	1.3	37.7	
	Bottom					[illegible]	[illegible]											[illegible]	
I-Group	Top	25.0	7.1	45.5	11.9			20.0	2.4		2.4	16.7	2.4			44.6	59.5	20.6	
	Bottom	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
I- Individual	Top	8.3	20.0								40.0	33.3	40.0					2.5	
	Bottom					[illegible]	[illegible]											[illegible]	
T- Class	Top			9.1	5.3									80.0	21.1	10.7	31.6	9.3	
	Bottom																	[illegible]	
T-Group	Top	66.7	15.7	45.5	9.8	5.3	2.0	60.0	5.9	100.0	5.9	50.0	[illegible]			30.4	33.3	25.0	
	Bottom	[illegible]	24.4	[illegible]	[illegible]			[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Percent Column Totals	Top	5.9		5.4		9.3		2.5		1.5		2.9		2.5		27.5			
	Bottom	[illegible]		[illegible]		[illegible]		[illegible]						[illegible]		[illegible]			

Table 77

Frequencies of Pupil Events within Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Reading

Contexts	Teacher Group	Pupil Events																		Pupil Events																Percent Row Total
		+ Academic Performance		+ Attentiveness		+ Direction Following		+ Engagement		+ Participation		+ Volunteering		+ Work Habits		- Conduct		- Inattention		- Talking		0 Conduct		0 Engagement		0 Inattention		0 Work Habits		+ Oral Reading		+ Phonics Skill		+ Reading Comprehension		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top	14.3	14.3											11.1	42.9	12.5	14.3	9.1	14.3											11.1	14.3					3.5
	Bottom																																			
I-Class	Top	14.3	1.2					55.7	53.7					44.4	14.6	25.0	2.4	36.4	4.9	71.4	6.1	40.0	2.4	40.0	4.9	75.0	3.7	41.7	6.1							41.2
	Bottom	50.0	3.0			33.3	[illegible]	16.7	39.4					44.4	24.2	33.3	[illegible]	23.1	9.1							42.3	3.3	[illegible]	[illegible]							[illegible]
I-Group	Top							29.1	48.9					22.2	12.6	37.5	6.4	27.3	6.4	14.3	2.1			50.0	10.6			50.0	12.8							23.6
	Bottom	50.0	1.2					64.1	62.5					44.4	10.9	66.7	3.6	21.5	10.0	100.0	3.6	[illegible]	[illegible]			14.3	[illegible]	[illegible]	3.6	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]
I-Individual	Top							1.3	33.3					7.4	66.7																					1.5
	Bottom							7.7	60.0					11.1	20.0			7.7	10.0									[illegible]	[illegible]							[illegible]
T- Class	Top	57.1	21.1	11.1	5.3			6.3	26.3									18.2	10.5	14.3	5.3	40.0	10.5					8.3	5.3	33.3	15.8					9.5
	Bottom					16.7	10.0	7.7	60.0									7.7	10.0			20.0	[illegible]			14.3	[illegible]									[illegible]
T-Group	Top	14.3	2.4	88.9	19.5	100.0	2.4	7.6	14.6			100.0	9.8	14.8	9.8	25.0	4.9	9.1	2.4			20.0	2.4	10.0	2.4	25.0	2.4			55.6	12.2			100.0	14.6	20.6
	Bottom			100.0	48.5	50.0	9.1	3.8	9.1	100.0	3.0	100.0	12.1									[illegible]	[illegible]			28.6	6.1							[illegible]	[illegible]	[illegible]
Percent Column Total	Top	3.5		4.5		.5		39.7				2.0		13.6		4.0		5.5		3.5		2.5		5.0		2.0		6.0		4.5				[illegible]		
	Bottom	1.2		3.6		3.6		47.[illegible]		.6		2.4		10.8		1.8		7.8		1.2		[illegible]				[illegible]		[illegible]		1.8				2.4		

Table 78

Frequencies of Teacher Responses in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Reading

Contexts		Teacher Responses														Teacher Responses								Percent Row Total
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top													5.3	90.9			14.3	9.1							4.5
	Bottom																									
I-Class	Top	22.2	2.5			50.0	1.3							36.9	87.3			28.6	2.5			30.0	3.8	25.0	2.5	32.5
	Bottom	*50.0*	*10.3*			*9.1*	*2.6*					*33.3*	*2.6*	*17.7*	*74.4*	*16.7*	*2.6*	*50.0*	*2.6*					*22.2*	*5.1*	*18.1*
I-Group	Top													26.2	94.2							10.0	1.9	25.0	3.8	21.4
	Bottom	*37.5*	*2.9*	*100.0*	*1.0*	*54.5*	*5.7*	*33.3*	*1.9*					*49.4*	*77.1*	*16.7*	*1.0*	*50.0*	*1.0*	*66.7*	*1.9*	*100.0*	*2.9*	*55.6*	*4.8*	*48.6*
I-Individual	Top					50.0	20.0							2.1	80.0											2.1
	Bottom					*36.4*	*25.0*	*33.3*	*12.5*					*5.5*	*56.3*									*11.1*	*6.3*	*7.4*
T-Class	Top	11.1	3.6	100.0	3.6			16.7	3.6					10.2	67.9	30.8	14.3	28.6	7.1							11.5
	Bottom	*12.5*	*6.7*											*7.9*	*86.7*									*11.1*	*6.7*	*6.9*
T-Group	Top	66.7	8.8					83.3	7.4					19.3	52.9	69.2	13.2	28.6	2.9			60.0	8.8	50.0	5.9	28.0
	Bottom							*33.3*	*4.9*			*66.7*	*4.9*	*13.5*	*78.0*	*66.7*	*9.8*			*33.3*	*2.4*					*19.0*
Percent Column Total	Top	3.7		.4		.8		2.5						77.0		5.3		2.9				4.1		3.3		
	Bottom	*3.7*		*.5*		*5.1*		*2.8*				*1.4*		*75.9*		*2.8*		*.9*		*1.4*		*1.4*		*4.2*		

Table 79

Frequencies of Pupil Events within Teacher Activities for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Reading

		PUPIL EVENT																																		
		+ Academic Performance		+ Attentiveness		+ Direction Following		+ Engagement		+ Participation		+ Volunteering		+ Work Habits		- Conduct		- Inattention		- Talking		0 Conduct		0 Engagement		0 Inattention		0 Work Habits		+ Oral Reading		+ Phonic Skills		+ Reading Comprehension		
TEACHER ACTIVITY	Teacher Group	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Percent Row Total
Academic Monitoring	Top			14.3	20.0			3.2	40.0									25.0	40.0																	3.7
	Bottom							4.2	75.0																	20.0	25.0									[illegible]
Answering	Top																																			0
	Bottom							9.7	77.8					5.9	11.1													16.7	11.1							6.3
Asking	Top	16.7	20.0									25.0	20.0	3.8	20.0															25.0	20.0					3.0
	Bottom			7.1	33.3							66.7	66.7																							[illegible]
At Board	Top																																			0
	Bottom							1.4	100.0																											.7
At Desk	Top							37.1	76.7											40.0	6.7			22.2	6.7	33.3	3.3	22.2	6.7							18.3
	Bottom	50.0	4.5					19.4	63.6					35.3	27.3													16.7	4.5							15.2
Checking	Top	16.7	14.3					1.6	14.3					11.5	42.9			12.5	14.3	20.0	14.3															4.3
	Bottom							2.8	18.2					23.5	36.4			9.1	9.1			33.3	9.1			20.0	9.1	33.3	18.2							[illegible]
Circulating	Top							12.9	36.4					34.6	40.9	25.0	9.1							11.1	4.5	33.3	4.5	11.1	4.5							13.4
	Bottom					100.0	5.3	13.9	52.6									36.4	21.1			33.3	5.3			20.0	5.3			100.0	10.5					[illegible]
Discussing	Top											25.0	14.3			12.5	14.3							22.2	28.6			11.1	14.3					50.0	28.6	4.3
	Bottom			57.1	57.1			1.4	7.1									9.1	7.1	50.0	7.1													75.0	21.4	[illegible]
Explaining	Top			42.9	33.3			1.6	11.1			25.0	11.1	3.8	11.1	12.5	11.1											11.1	11.1	12.5	11.1					5.5
	Bottom			14.3	66.7							33.3	33.3																							[illegible]
Helping	Top							11.3	36.8					19.2	26.3			12.5	5.3	20.0	5.3	75.0	15.8	11.1	5.3	33.3	5.3									11.6
	Bottom	50.0	4.8					23.9	47.6					23.5	19.0	33.3	4.8	27.3	14.3							20.0	4.8	16.7	4.8							14.5
Instruction Giving	Top					100.0	20.0							3.8	20.0	25.0	40.0			20.0	20.0															3.0
	Bottom			7.1	50.0			1.4	50.0																											1.4
Listening	Top																													25.0	100.0					1.2
	Bottom																																			[illegible]
Question & Answer	Top											25.0	20.0	7.7	40.0													11.1	20.0					25.0	20.0	3.0
	Bottom																																			[illegible]
Supervising	Top							8.1	100.0																											3.0
	Bottom							5.6	80.0													33.3	20.0													[illegible]
Work With	Top	66.7	9.3	42.9	7.0			24.2	34.9					15.4	9.3	25.0	4.7	50.0	9.3			25.0	2.3	33.3	7.0			33.3	7.0	37.5	7.0			25.0	2.3	[illegible]
	Bottom			14.3	6.1			26.4	61.3					11.8	6.5	66.7	6.5	15.2	6.1	[illegible]	3.2					20.0	3.2	16.7	3.2					[illegible]	[illegible]	[illegible]
Percent Column Total	Top			4.3		.6		37.8		0		2.4		15.9		4.9		4.9		3.0		2.4		5.5		1.8		4.9		4.9		0		2.4		
	Bottom	2.4		9.7		.7		40.7		0		2.1		11.7		2.1		7.6		1.4		2.1		0		3.4		4.1		1.4		0		2.6		

Table 80

Frequencies of Teacher Responses Associated with Pupil Events for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Reading

		TEACHER RESPONSES																								
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		
PUPIL EVENTS	Teacher Group	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Percent Row Total
+ Academic Performance	Top													1.3	28.6	20.0	28.6	60.0	42.9							3.7
	Bottom															20.0	50.0	50.0	50.0							[illegible]
+ Attentiveness	Top													5.7	100.0											4.8
	Bottom													11.3	100.0											9.6
+ Direction Following	Top													.6	100.0											.5
	Bottom													4.2	100.0											3.6
+ Engagement	Top	25.0	1.4											45.9	98.6											39.4
	Bottom	33.3	1.3											52.8	94.9	20.0	1.3	50.0	1.3					12.5	1.2	[illegible]
+ Participation	Top																									0
	Bottom													.7	100.0											.6
+ Volunteering	Top							100.0	50.0							20.0	50.0									2.1
	Bottom							66.7	66.7					.7	33.3											[illegible]
+ Work Habits	Top													12.6	95.2			20.0	4.8							11.2
	Bottom	33.3	5.6			100.0	5.6							10.6	83.3					50.0	5.6					[illegible]
- Conduct	Top													2.5	50.0									80.0	50.0	4.3
	Bottom													1.4	66.7									12.5	22.2	[illegible]
- Inattention	Top			100.0	9.1									5.7	81.8									20.0	9.1	5.9
	Bottom													7.0	76.9					50.0	7.7			25.0	[illegible]	[illegible]
- Talking	Top													4.4	100.0											3.7
	Bottom							33.3	50.0															12.5	50.0	[illegible]
0 Conduct	Top													3.8	100.0											3.2
	Bottom													3.5	100.0											[illegible]
0 Engagement	Top													5.7	100.0											4.8
	Bottom																									
0 Inattention	Top													2.5	100.0											2.1
	Bottom													2.8	57.1									37.5	[illegible]	[illegible]
0 Work Habits	Top	25.0	8.3											6.3	83.3							50.0	8.3			6.4
	Bottom	33.3	16.7											3.5	83.3											[illegible]
+ Oral Reading	Top	50.0	22.2											1.3	22.2	40.0	44.4					50.0	11.1			[illegible]
	Bottom													.7	50.0							100.0	50.0			[illegible]
+ Phonic Skills	Top																									0
	Bottom																									
+ Reading Comprehension	Top													1.9	50.0	20.0	33.3	20.0	16.7							3.2
	Bottom													.7	25.0	60.0	75.0									2.4
Percent Column Total	Top	2.1		.5		0		1.1		0		0		84.6		3.3		2.7		0		1.1		2.7		
	Bottom	3.3		0		.6		1.8		0		0		85.0		3.0		1.2		1.2		.6		4.8		

Table 41

Frequencies of Teacher Activities in Contexts for Teachers
with Better than Predicted and Teachers with Poorer than
Predicted Outcomes in Fifth Grade Mathematics

Contexts		Academic Organizing		Answering		Asking		At Board		At Desk		Checking		Circulating		Discussing		Explaining		Helping		Instruction Giving		Listening		Question & Answer		Supervising		Work With		Percent Row Total
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top																															
	Bottom																															
I-Class	Top											13.3	20.0	50.0	10.0			8.3	10.0	100.0	60.0											8.[illegible]
	Bottom									[illegible]	[illegible]	63.0	42.3	[illegible]	30.4			[illegible]	1.4	51.4	[illegible]							[illegible]	[illegible]			[illegible]
I-Group	Top							22.2	5.6	100.0	30.6	6.7	2.8			25.0	2.8	8.3	2.8			44.4	11.1							55.2	44.4	30.1
	Bottom	40.[illegible]	3.0	100.0	11.8	[illegible]	[illegible]			38.[illegible]	7.6	28.1	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	33.2	[illegible]							[illegible]	[illegible]	[illegible]
I- Individual	Top																															
	Bottom									14.3	15.4			[illegible]	[illegible]															17.3	47.5	8.8
T- Class	Top					76.5	31.7	33.3	7.3			80.0	29.3	50.0	2.4	50.0	4.9	25.0	7.3			22.2	4.9							17.2	12.2	34.5
	Bottom	80.0	4.8			48.5	24.2					[illegible]	[illegible]			100.0	[illegible]			[illegible]	2.2	22.2	[illegible]			[illegible]	[illegible]			[illegible]	[illegible]	[illegible]
T-Group	Top					23.5	12.5	44.4	12.5							25.0	3.1	58.3	21.9			33.3	9.4	100.0	6.3			100.0	9.4	27.6	25.0	26.9
	Bottom					26.4	[illegible]											22.2	[illegible]			22.2	[illegible]							[illegible]	[illegible]	[illegible]
Percent Column Totals	Top					14.3		9.2		7.6		12.6		1.7		3.4		10.1		5.0		7.6		1.7				2.5		24.4		
	Bottom	2.5		3.9		5.4				6.3		22.5		12.7		[illegible]		[illegible]		13.7		[illegible]				[illegible]		[illegible]		[illegible]		

Table 82

Frequencies of Pupil Events within Contexts for Teachers
with Better than Predicted and Teachers with Poorer than
Predicted Outcomes in Fifth Grade Mathematics

Contexts	Teacher Group	Pupil Events																	
		+ Academic Performance		+ Attentiveness		+ Direction Following		+ Engagement		+ Participation		+ Volunteering		+ Work Habits		- Conduct		- Inattention	
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %
A-Group	Top																		
	Bottom																		
I-Class	Top							29.0	52.9							66.7	11.8	5.6	5.9
	Bottom			25.0	6.0	18.2	4.0	10.0	10.0					53.3	16.0			21.7	10.0
I-Group	Top			7.1	5.4			45.2	37.8					54.5	16.2			55.6	27.0
	Bottom					9.1	1.7	33.9	33.9					33.3	8.5	100.0	5.1	60.9	23.7
I-Individual	Top																		
	Bottom							30.0	30.0					6.7	10.0			4.3	10.0
T- Class	Top			53.6	28.3	50.0	50.0	6.5	3.8	100.0	1.9	37.5	5.7	36.4	7.5			33.3	11.3
	Bottom			66.7	15.4	36.4	7.7	5.8	5.8	100.0	11.5	33.3	3.8					8.7	3.8
T-Group	Top			39.3	25.0	50.0	50.0	19.4	13.6			62.5	11.4	9.1	2.3	33.3	2.3	5.6	2.3
	Bottom			8.3	5.3	36.4	21.1	5.3	5.3			67.5	21.1	6.7	5.3			4.3	5.3
Percent Column Total	Top	0		18.5		2.6		20.5		.7		5.3		7.3		2.0		11.9	
	Bottom	0		6.3		5.8		16.8		3.2		3.2		7.9		1.6		12.1	

Contexts	Teacher Group	Pupil Events																Percent Row Total
		- Talking		0 Conduct		0 Engagement		0 Inattention		0 Work Habits		+ Number Concepts		- Number Concepts		0 Number Concepts		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top																	
	Bottom																	
I-Class	Top	33.3	11.8					50.0	11.8	33.3	5.9							11.3
	Bottom	83.3	10.0	40.0	4.0	50.0	2.0	25.0	2.0	18.2	4.0	17.6	12.0	57.1	16.0	33.3	4.0	26.3
I-Group	Top			33.3	2.7					33.3	2.7	12.5	8.1					24.5
	Bottom	16.7	1.7	60.0	5.1	50.0	1.7			27.3	5.1	17.6	10.2			33.3	3.4	31.1
I-Individual	Top																	
	Bottom							50.0	30.0	27.3	30.0							5.8
T- Class	Top	50.0	5.7	33.3	1.9			50.0	3.8			45.8	20.8	40.0	3.8	50.0	1.9	35.1
	Bottom							25.0	1.9	27.3	5.8	44.1	28.8	42.9	11.5	33.3	3.8	27.4
T-Group	Top	16.7	2.3	33.3	2.3					33.3	2.3	41.7	22.7	60.0	6.8	50.0	2.3	29.1
	Bottom											20.6	36.8					10.0
Percent Column Total	Top	4.0		2.0				2.6		2.0		15.9		3.3		1.3		
	Bottom	3.2		2.6		1.1		2.1		5.8		17.2		7.4		3.2		

Table 83

Frequencies of Teacher Responses in Contexts for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Mathematics

Contexts		Teacher Responses														Teacher Responses										Percent Row Total
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		
		Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
A-Group	Top																									
	Bottom																									
I-Class	Top					33.3	7.1							8.5	71.4							25.0	7.1	50.0	14.3	8.5
	Bottom	16.7	2.9	16.7	1.4	66.7	2.9	25.0	4.3					33.1	82.9	11.1	1.4	100.0	2.9			25.0	1.4			30.6
I-Group	Top			75.0	6.7	33.3	2.2	12.5	2.2					30.8	80.0	20.0	4.4					25.0	2.2	25.0	2.2	27.3
	Bottom	25.0	4.5	33.3	3.0	33.3	1.5	8.3	1.5					33.1	87.9	11.1	1.5									28.8
I-Individual	Top																									
	Bottom							16.7	16.7					4.6	66.7							25.0	8.3	33.3	8.3	5.2
T-Class	Top	14.3	1.8			33.3	1.8	37.5	5.5	100.0	1.8			33.3	70.9	50.0	9.1	50.0	1.8	100.0	7.3					33.3
	Bottom	50.0	9.8	50.0	4.9			25.0	4.9	100.0	1.6	100.0	3.3	21.1	60.7	55.6	8.2					50.0	3.3	66.7	3.3	26.6
T-Group	Top	85.7	11.8	25.0	2.0			50.0	7.8			100.0	2.0	27.4	62.7	30.0	5.9	50.0	2.0			50.0	3.9	25.0	2.0	30.9
	Bottom	8.3	5.0					25.0	15.0					8.0	70.0	22.2	10.0									8.7
Percent Column Total	Top	4.2		2.4		1.8		4.8		.6		.6		70.9		6.1		1.2		2.4		2.4		2.4		
	Bottom	5.2		2.6		1.3		5.2		.4		.9		76.4		3.9		.9				1.7		1.3		

Table 84

Frequencies of Pupil Events within Teacher Activities for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Mathematics

TEACHER ACTIVITY	Teacher Group	PUPIL EVENTS + Academic Performance Col %	 Row %	 + Attentiveness Col %	 Row %	 + Direction Following Col %	 Row %	 + Engagement Col %	 Row %	 + Participation Col %	 Row %	 + Volunteering Col %	 Row %	 + Work Habits Col %	 Row %	 - Conduct Col %	 Row %	 - Inattention Col %	 Row %	 - Talking Col %	 Row %	 0 Conduct Col %	 Row %	 0 Engagement Col %	 Row %	 0 Inattention Col %	 Row %	 0 Work Habits Col %	 Row %	 + Number Concepts Col %	 Row %	 - Number Concepts Col %	 Row %	 0 Number Concepts Col %	 Row %	Percent Row Total
Academic Organizing	Top							5.3	100.0																											1.0
	Bottom					11.1	20.0	3.8	30.0																											[illegible]
Answering	Top																																			0
	Bottom							3.8	16.7					6.7	16.7			10.0	33.3			25.0	16.7							4.0	16.7					3.3
Asking	Top			6.7	7.7							25.0	7.7					13.3	15.4			50.0	7.7			50.0	7.7			27.8	38.5	66.7	15.4			13.4
	Bottom									80.0	40.0	16.7	10.0																	20.0	50.0					6.5
At Board	Top			6.7	12.5			10.5	25.0			25.0	12.5					6.7	12.5											16.7	37.5					8.2
	Bottom																																			0
At Desk	Top							5.3	14.3									26.7	57.1									50.0	14.3	5.6	14.3					7.2
	Bottom			33.3	21.4			7.7	14.3					26.7	28.6	33.3	7.1	10.0	14.3			25.0	7.1					3.1	7.1							5.8
Checking	Top			6.7	11.1			5.3	11.1					33.3	22.2			6.7	11.1	33.3	11.1					50.0	11.1			5.6	11.1			33.3	11.1	9.3
	Bottom					44.4	12.1	11.5	9.1					46.7	21.2			10.0	6.1	66.7	12.1							38.4	15.2	4.0	3.0	55.6	15.2	60.0	9.1	20.8
Circulating	Top							21.1	66.7					16.7	16.7															5.6	16.7					6.2
	Bottom							7.7	10.5									5.0	5.3			25.0	5.3	50.0	5.3	100.0	15.8	15.4	10.5	16.0	21.1	44.4	21.1	20.0	5.3	12.3
Discussing	Top																	6.7	50.0											5.6	50.0					2.1
	Bottom			11.1	50.0																									4.0	50.0					1.3
Explaining	Top			46.7	70.0			10.5	20.0																					5.6	10.0					10.3
	Bottom																	5.0	100.0																	.6
Helping	Top							15.8	60.0							100.0	40.0																			5.2
	Bottom							34.6	37.5					6.7	4.2	86.7	8.3	25.0	20.8	33.3	8.3	25.0	4.2					3.1	4.2	12.0	12.5					15.5
Instruction Giving	Top			13.3	28.6	66.7	28.6	5.3	14.3					16.7	14.3							50.0	14.3													7.2
	Bottom			11.1	14.3	22.2	28.6											15.0	42.9											4.0	14.3					4.5
Listening	Top							10.5	100.0																											2.1
	Bottom																																			0
Question & Answer	Top																																			0
	Bottom											16.7	50.0																	4.0	50.0					1.3
Supervising	Top			6.7	33.3	33.3	33.3																									33.3	33.3			3.1
	Bottom							3.8	20.0									15.0	60.0											4.0	20.0					3.2
Work With	Top			13.3	8.3			10.5	8.3			50.0	8.3	33.3	8.3					66.7	8.3							50.0	4.2	27.8	20.8			66.7	8.3	24.7
	Bottom			44.4	12.1	22.2	6.1	26.9	21.2	20.0	2.0	66.7	12.1	13.3	6.1			5.0	3.0					50.0	2.0			25.6	3.2	32.0	24.2			20.0	3.0	[illegible]
Percent Column Total	Top	0		5.7		5.7		16.5		0		3.8		9.5		1.9		15.5		3.1		2.1		0		2.1		2.1		8.6		3.1		3.1		
	Bottom	0		15.5		3.1		19.6		3.2		4.1		9.5		5.1		22.7		3.3		1.8		1.6		1.3		7.2		12.3		[illegible]		3.2		

Table 85

Frequencies of Teacher Responses Associated with Pupil Events for Teachers with Better than Predicted and Teachers with Poorer than Predicted Outcomes in Fifth Grade Mathematics

		TEACHER RESPONSES																								
		Instructing		Disciplining		Helping		Ignoring		Moves On		Negative Feedback		None		Positive Feedback		Praise		Questioning		Recognizing		Redirecting		Perce Row Tota
PUPIL EVENTS	Teacher Group	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	Col %	Row %	
+ Academic Performance	Top																									0
	Bottom																									0
+ Attentiveness	Top									100.0	4.8			19.2	90.5							50.0	4.8			15.1
	Bottom													7.4	100.0											6.
+ Direction Following	Top													5.1	100.0											3.6
	Bottom													6.7	90.5							[illegible]	[illegible]			6.0
+ Engagement	Top	80.0	13.8			25.0	3.4							23.2	79.3							50.0	3.4			20.9
	Bottom													20.8	100.0											16.9
+ Participation	Top																									0
	Bottom	[illegible]	[illegible]													44.4	66.7									[illegible]
+ Volunteering	Top							71.4	83.3					1.0	16.7											4.1
	Bottom	12.5	[illegible]					60.0	33.3					2.0	50.0											3.2
+ Work Habits	Top													12.1	92.3			50.0	7.7							9.4
	Bottom													9.4	93.3							50.0	[illegible]			[illegible]
- Conduct	Top													3.0	100.0											2.2
	Bottom													2.0	100.0											[illegible]
- Inattention	Top			100.0	18.8									11.1	68.8									[illegible]	[illegible]	11.5
	Bottom			[illegible]	[illegible]									14.1	95.5											[illegible]
- Talking	Top							14.3	25.0					3.0	75.0											2.9
	Bottom													4.0	100.0											[illegible]
0 Conduct	Top													3.0	100.0											[illegible]
	Bottom			[illegible]	[illegible]	100.0	20.0							2.0	60.0											.7
0 Engagement	Top																									0
	Bottom													[illegible]	100.0											.5
0 Inattention	Top							14.3	33.3					1.0	33.3									[illegible]	[illegible]	[illegible]
	Bottom													2.0	75.0									100.	[illegible]	2.2
0 Work Habits	Top													3.0	100.0											2.2
	Bottom			[illegible]	[illegible]			25.0	10.0					4.0	80.0											5.5
+ Number Concepts	Top					25.0	4.0							14.1	56.0	100.0	32.0			50.0	8.0					18.0
	Bottom	[illegible]	[illegible]							100.0	3.2			14.8	71.0	[illegible]	[illegible]	[illegible]	[illegible]							16.5
- Number Concepts	Top	20.0	20.0									100.0	20.0					50.0	20.0	50.0	40.0					3.6
	Bottom	[illegible]	[illegible]									100.0	[illegible]	7.4	78.6											7.7
0 Number Concepts	Top					50.0	66.7							1.0	33.3											2.2
	Bottom	12.5	14.3	[illegible]	14.3			25.0	14.3					2.7	57.1											[illegible]
Percent Column Total	Top	3.6		2.2		2.9		5.0		.7		.7		71.2		5.8		1.4		2.9		1.4		2.2		
	Bottom	4.1		[illegible]		.5		2.2		.5		.5		81.4		4.9		[illegible]		0		[illegible]		[illegible]		

Summary of the Findings from the APPLE Observations

The behavior recording system employed in APPLE observations provided data on pupil behavior in reading and mathematics instruction, teacher responses to pupil behavior, the instructional contexts for both instructional areas at each grade level, and the teaching activities which typified teacher behavior at second and fifth grades in reading and mathematics lessons. In addition, time duration data were available. These data reflected time allocation of instruction in the several contexts which were common to the BTES classes. In this section, we will review the several generalizations we have made. These generalizations summarize the results of our investigation, and provide information about second and fifth grade teacher performance characteristics as well as the validity of these characteristics for predicting children's learning.

Description of Pupil and Teacher Behavior in BTES Classrooms

From the discussion of the statistics describing central tendencies and variabilities of these data across classrooms, instructional areas, and grade levels, several statements appropriately summarize the results.

1. Differences in incidence of pupil events are a function of the instructional area, the instructional context and the teaching activities. This finding means that one must expect to find different types of pupil behavior and differing frequencies of pupil behavior, depending on whether the child is a second or a fifth grader, whether he is involved in reading or mathematics lessons, whether he is working with the teacher or independently, and what the activity of the teacher is.

2. In general, we can conclude that fifth graders will be expected to spend more of their classroom time working independently of the teacher for both reading and mathematics activities than will second graders. While there is considerable variability among second grade teachers in the use of different instructional contexts, second grade pupils will be involved in more teacher-directed instruction than fifth graders.

3. The quality of teacher responses to pupil behavior is very similar across both grade and instructional area. The response of "None" to observed pupil behavior occurred about two-thirds of the time. We do not mean to imply that a teacher response should accompany every observed pupil behavior; rather the data indicate the probability of the occurrence of any teacher response to pupil behavior in the classroom.

4. In organized instructional periods such as reading and mathematics, conduct problems and need for teacher disciplining are not common. This finding suggests that supervisors, and others who visit classrooms, cannot rely on the absence of conduct problems as good evidence for teacher competency. Inappropriate behavior during academic lessons was relatively rare.

Descriptions of Time Allocations in Contexts in BTES Classrooms

When we examined teacher performance with respect to the ways teachers distributed classroom instructional time in different contexts, these generalizations followed from the descriptive statistics.

1. Second graders spend more total minutes in reading instruction than do fifth graders, and this is primarily reflected in more time spent in group instruction and time spent being taught by other adults.

Independent-Individual contexts, those contexts in which pupils were working on an individualized assignment different from other pupils and independently of the teacher, were more common in second grade reading than in second grade mathematics and also more common than in fifth grade instruction.

2. One surprising finding was that the average proportion of pupil productive time in individual contexts in reading was relatively small. Few pupils receive such instruction and of those who do, the average percent of productivity as judged by the observers was lower than the percent of gross productivity. This finding implies that the teacher's choice of this context for certain pupils is not always a wise one. Only those pupils who can manage such a context for significant periods of time (probably greater than 5 to 10 minutes) are likely to profit from it at all.

3. The primary difference in time allocation in mathematics between grades was the relatively greater proportion of time spent in Teacher-Class contexts at second grade.

4. The time spent in Independent-Individual, Adult-Individual, Teacher-Individual and Adult-Group contexts is not generally productive time in mathematics when the percent of productive time was averaged across pupils. However, when the gross productive time was computed by finding the proportion of productive time by classroom, rather than averaging across pupils, the productivity rate for these contexts was as high as for other contexts. This finding, along with the similar result reported for second grade, indicates that only a few pupils work productively in individual contexts. Therefore the average pupil productivity is lower in individual contexts than it is in settings where instruction

is by group or by class. However, individual contexts are appropriate and productive for some pupils. Thus, when one looks at the rate obtained by dividing total productive time for all target pupils by total time in that context for all target pupils, the productivity is higher.

Validity of Observational Variables for Predicting Reading Outcomes

The great variability in pupil and teacher behavior between grade levels and between instructional areas leads to the preliminary conclusion that we can not expect to find a set of teacher performance variables which will be valid for predicting learning outcomes across grade levels and instructional areas. The results of the partial correlations between observation variables and the reading achievement measures support this initial impression. Some of the generalizations that we can make on the basis of correlations between observation variables and reading achievement are:

1. Talking out inappropriately in classrooms during reading instruction was uniformly related to poorer reading outcomes. There was also an inverse relationship between the observed frequency of pupil behavior which was not consistent with teacher expectations (but not necessarily serious enough to warrant teacher intervention) and achievement outcomes.

2. Evidence of positive achievement in phonics skills was positively correlated with outcomes for second grade and negatively correlated with reading outcomes for fifth grade. This suggests that teacher instruction in phonics skills enabled second graders to improve their achievement. However, it appears that teacher instruction in phonics at fifth grade was directed at pupils with learning difficulties and perhaps was not the most effective means by which to improve learning for all pupils in the classroom.

3. Conversely, evidence of positive achievement in oral reading was positively correlated with outcomes at fifth grade, but not at second grade where oral reading is regularly observed for all pupils in reading instruction.

4. With regard to teacher activities, we offer the tentative hypothesis that the more the teacher is involved in organizing the class for instruction (as evidenced by negative correlations between activities like "Academic Organizing," "Asking Questions," "Discussion," and "Instruction-Giving," and reading achievement) and the less the teacher is involved in "Working With" pupils and "Checking" to see if they are understanding their work, the poorer the end of the year reading achievement. We do not intend to imply that teacher activities like "Academic Organizing," "Asking" questions and so forth are not important teacher performances. However, as the frequency of these activities increases, the frequency of actual instruction decreases. Consequently there will be reduced opportunity for reading instruction, resulting in less improvement in reading at the end of the year.

Validity of Observational Variables for Predicting Mathematics Outcomes

In comparison to reading outcomes, a different set of observation variables were valid for predicting mathematics learning. The following conclusions follow from the analysis of the validity of the observation variables:

1. In second grade mathematics lessons during which there is a high frequency of inappropriate conduct, obvious inattention to classroom work, and talking out of turn, there is more likelihood that achievement scores in mathematics will not increase as predicted at the end of the year.

2. Though noticeably inappropriate behavior did not characterize fifth grade pupils in mathematics assignments, the frequency of inattention to task which was not disruptive or particularly noticeable was uniformly negatively correlated to mathematics learning.

3. The frequency of Independent-Group and Independent-Class contexts was negatively correlated with achievement outcomes at both grade levels, suggesting that classrooms in which pupils were working independently of teachers most of the time were those with poorer mathematics achievement.

4. A surprising finding was that teacher instructional activities were observed with less frequency in mathematics than in reading. Only "Asking" had a significant correlation with outcome and it was negatively correlated. The tentative conclusion is that teachers who spend time asking questions are those whose lessons are not understood or whose assignments are at an inappropriate level of difficulty.

5. Six out of 12 teacher responses at fifth grade and three of 12 at second grade had a significant relationship to mathematics achievement. At second grade, teachers who employ disciplining, recognizing, and redirection have poorer than expected achievement. At fifth grade, giving help, providing positive feedback, and praise are positively correlated with achievement. Recognizing and redirecting are negatively correlated with mathematics learning at fifth grade.

Validity of Observation Variables for Predicting Attitude Outcomes

A most interesting finding was that teacher performance variables which have a valid relationship to pupil's learning may have an inverse relationship to changes in pupil's attitudes toward learning and toward themselves.

1. Different sets of appropriate and inappropriate pupil behavior were correlated with reading and mathematics attitudes and for second and fifth grade. We have to conclude, therefore, that it is unrealistic to assume that one can define an omnibus set of teacher performance variables, which, if present in a group of teachers, will guarantee positive learning outcomes as well as positive attitudes.

2. With respect to attitudes toward reading and mathematics, second grade classrooms in which target pupils were observed to be positively engaged in the activities of the class and in which they were not misbehaving or talking out inappropriately were those with the most positive attitudes at the end of the year.

3. Since the Pupil Survey items ask questions about how children judge their abilities with respect to peers, it was not surprising that some pupil event variables evidencing appropriate pupil behavior had negative correlations with the survey measures. In some clssrooms, positive participation of target pupils may cause pupils to contrast the adequacy of their performance unfavorably with that of their classmates, resulting in a negative correlation between some positive behaviors and the survey measure.

4. At second grade, "Academic Performance," "Attentiveness" and "Direction Following" had a positive relationship to the survey measure suggesting an age difference in the implications of these types of pupil behavior on attitudes toward self worth.

5. There seemd to be no significant relationship between the incidence of the instructional contexts and attitudes across either grade level or instructional area. Attitudes, therefore, are more dependent on teacher and pupil behavior in the classroom.

6. The teacher activities which are significantly related to attitude and are always positively correlated with attitude and survey outcomes across instructional area are: "Checking," "Listening," "Supervising". Those with uniformly significant negative correlations are "Circulating" and "Instruction Giving".

7. Teacher responses to pupil behavior had different patterns of relationships to attitudes according to whether teacher responses were observed in reading or mathematics and whether pupils were second or fifth graders. The data indicated that the incidence of disciplining and negative feedback in a classroom cannot be judged to be always negatively correlated to general attitudes in the classroom. On the other hand, the extent of positive feedback was always positively related to attitudes when the partial correlations were significant.

8. From the analysis of teacher activities and responses, we tentatively infer that teacher behavior which calls attention to children, and perhaps places them in an unfavorable comparison with their classmates, may have a negative affect on attitude, even though these same teacher behaviors have a positive relationship to achievement outcomes.

Overview of Relationship of Observation Variables to Achievement and Attitude Outcomes

The criterion of retention of an observation variable as a potential measure of teacher performance was a significant relationship with two or more outcome measures. The criterion of retention for attitude outcomes was a significant correlation with an outcome at both grade levels. Using these criteria of retention, only a handful of APPLE variables could not be considered potentially valid teacher performance measures. However, there are enough differences between grade levels and between reading and mathematics instruction that we cannot generalize across grades and instructional areas regarding which teacher performance data will always be valid for predicting pupil achievement or attitude outcomes.

Time Allocation Data as Predictors of Learning and Attitude Outcomes

The length of time pupils spent in some instructional contexts relates to achievement and attitude outcomes. Some of the interesting findings were:

1. The more time pupils spent in individual contexts in second grade reading, the better their performance in reading comprehension.

2. While the amount of time second grade pupils worked independently and productively in individual contexts was correlated with the reading comprehension measures, the amount of time the teacher spent conducting reading lessons for the class was significantly correlated with the Decoding Test. The data offered clear evidence that the learning of decoding skills at second grade was dependent upon the amount of learning time during which the teacher is in charge of class instruction.

3. The amount of learning time in context does not always have a positive relationship to outcomes. An example was the negative correlations between the Independent-Group context and the reading measures. Time measures may have a curvilinear relationship to achievement. Some effort to determine the amount of time which is the optimum for learning in each context would be an excellent way to extent our understanding of the duration of classroom experiences and learning.

4. Fifth graders who spent more time in contexts where teachers are in charge of instruction have higher scores on reading comprehension measures.

5. The most effective context time allocations for mathematics learning were the several individual contexts. Even though individual contexts were common to only a few BTES classrooms, the data indicated that the more time second graders spent in individual contexts, and the more this time was productively spent, the better their mathematics learning.

6. While time spent in individual contexts in mathematics was important to second grade mathematics achievement, the amount of time pupils were taught mathematics by the teacher in fifth grade classes was significantly related to outcomes.

7. Both mathematics and decoding skills require rule and principle learning and practice in applying these rules and principles. The more time the teacher spends directing these learning experiences, the better the learning outcomes.

Interrelationship of Pupil and Teacher Observation Variables

In order to illustrate the importance of studying the observational data as sets of interdependent pupil and teacher characteristics, we prepared tables reporting the frequencies of occurrence of pupil behavior in contexts, teacher activities in contexts and teacher responses in contexts. These tables provided an excellent overview of the kinds of pupil and teacher behavior one is likely to observe in these contexts. Since the tables contrasted observational data for the most and the least successful teachers in terms of predicted learning outcomes, they provided an interesting set of additional descriptions of important teacher performance measures. One additional set of tables reported the pupil behavior in different types of teaching activities, and another reported the teacher responses which were associated with pupil events.

The APPLE Information System makes possible the retrieval and analysis of any combination of pupil and teacher behavior variables. With the availability of such computer programs and the information offered in the tables reporting the crosstabulations, an important next step in understanding teacher performance characteristics will be a study of the interactions of pupil and teacher characteristics. The goal would be to study teacher and pupil behavior jointly as variables rather than to treat each set independently as we have done in this extensive overview of pupil and teacher behavior in the BTES classrooms.

Conclusion

In general the data reported here support the use of a behavior recording system as a valid tool for studying teacher performance characteristics. The APPLE system makes the fewest *a priori* assumptions about the nature of teacher and pupil behavior, can describe pupil and teacher characteristics with considerable fidelity, and identifies those pupil and teacher behaviors which are significantly related to learning and attitude outcomes for a particular grade and instructional area.

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APPENDIX A

Exploration of the Reliability of the APPLE Observation System

Sources of Error in APPLE Observations

In the main body of our report, we discussed sources of error in classroom observation procedures. The primary source of error to be minimized for most accurate measurement is error in the sampling of events to be observed. In the APPLE observations this error enters the record: 1) when observers do not see an event, 2) when observers position themselves by choice, or by circumstances beyond their control, so that observation of target pupils is difficult, 3) when observers do not observe the target pupils as directed, 4) when there are an insufficient number of observations of target pupils so that the event record is a biased sample of classroom behavior, 5) when observers do not describe an event with enough precision so that it can be encoded unequivocally, and 6) when observers fail to make a record of significant events.

There are other sources of error in the recording of behavior records which affect sampling of the classroom behavior, but they are procedural rather than sampling errors, and likely to account for low reliability between records of observer pairs when they observe the same classroom on the same day. Some of these procedural problems are: 1) not establishing times to begin and to end the observation record, 2) not agreeing on a procedure for the order in which target pupils are to be observed, and 3) observing in classrooms where movement around the room is impossible so that target pupils are observed from different vantage points. Procedural problems 1) and 2) can be minimized with instructions about when to begin and end the dual observations and about how to decide initially the order of observation of target pupils. Problem 3) can be minimized by having more days of dual observation so that there is a larger event record and consequently a more adequate sampling of classroom behavior.

Types of sampling error in the APPLE observation record. Reliability of reports of instructional contexts are subject to sampling error due to: 1) failure of the observer to record all context changes for target pupils and 2) the position of the observer in the classroom. The former source of error can be minimized by observer training; the latter usually is dependent upon the degree to which all of the target pupils are easily observed. For example, in "open" classrooms where pupils work independently on a variety of activities during an instructional period, it may be difficult to observe all of the context changes. In some BTES classrooms, target pupils were moved back and forth from an Independent-Individual, to a Teacher-Individual, to an Adult-Individual, and then to an Independent-Group context as they finished one assignment, went on to get instructions for another, began and finished that one, and then moved on to a previously designated activity. When all target pupils are variously engaged in such movement, error enters the observation record because the observers cannot obtain a complete sampling of context changes. More observations would reduce sampling error.

Error in the sampling of teacher activities is dependent on error in the sample of target pupil behaviors. Sampling error in the record of teacher activities occurs when the teaching activity associated with the target pupils is not an adequate sampling of teaching activity for the class as a whole. This error can be minimized by having more observations, as well as controls for the above-mentioned [illegible] of error in the pupil event record. Teacher responses are also dependent on the sampling of behavior for the target pupils, and sampling bias is the record of teacher responses can be kept minimal by control of the sources of error in the pupil event record.

Types of procedural error in the APPLE observation system. The procedures for observation in the BTES project provided for 20 days of observation by pairs of APPLE observers. These days were scheduled by the ETS Berkeley office on different dates throughout the observation period. There were no special instructions for the APPLE observers on the paired observation days, a factor which introduced procedural error over which we had no control. The observers confronted other problems, such as teachers scheduling a movie for the reading period, teachers arranging for instruction other than what was expected, teachers being absent, or observers being late for the observation. Parenthetically, we would like to note that these observations were carried on in the midst of the Gasoline Crisis of Spring, 1974. Our observers had to drive long distances and getting and having enough gas, as well as arriving for their assignments punctually, presented a genuine problem.

In addition to procedural problems introduced by unexpected classroom circumstances and scheduling difficulties attributed to the travel situation, there are other types of procedural error which can enter the classroom behavior record. Procedural, rather than sampling, error occurs when observers fail to make a descriptive record, and use inferential statements like "teacher praised the subject," rather than "teacher said, 'That is a very good answer.'" These two records of the classroom occurrence cause encoding ambiguity. Other encoding difficulties which are sources of procedural rather than sampling error result, for example, from incomplete behavior observations so that the encoder has to infer the intent of the observer from the overall content of the classroom record.

Procedural error can be reduced measurably by providing a longer training period for observers, by establishing methods for conducting paired observation which will produce records of the same time period, by encoding observations as soon as possible for the first few observation periods conducted upon completion of the training sessions, and by individualized feedback to an observer relative to the objectivity and completeness of the observation record.

The Reliability of APPLE Observations for Single Day Samples of Reading and Mathematics Instruction

The data collected from the dual observations nevertheless provided us with tentative evidence about the reliability of the APPLE observations, as well as detailed information about the sources of sampling and procedureal error to which the system is vulnerable. The results of this inquiry enabled us to specify more clearly sources of sampling error and a check list of procedural requirements for reliable observations.

After all of the observations had been encoded and processed into the computer files, we retrieved the observation record for the pairs of observers and computed the reliability of the pupil events, contexts, teacher activities and teacher responses. The non-normal distribution of the items in the observation categories precluded the use of parametric data analysis procedures. We considered other statistical methods, including score transformation, but decided to analyze the data as they stood, using a non-parametric method. We selected rank order correlation as the statistic which would provide an estimate of the degree to which the observers agreed on the frequency of classroom behaviors. We computed the rank order correlation for each pair of observers for events, contexts, activities and responses. These correlations are reported in Table 86.

For each pair of observers, we examined the data to determine which source of sampling or procedural error accounted for lowest reliabilities. This intensive review of the observer pairs with lowest reliabilities produced no evidence for a systematic source of sampling bias or error which would uniformly apply to all cases.

The next step was to evaluate whether low reliabilities were the result of sampling rather than procedural error. We first determined whether observer pairs who observed on days occurring immediately after training had lower reliabilities than observer pairs working later in the observation schedule. We found no evidence of an experience effect on the observation reliability data.

We next returned to the data sources and considered four aspects of the observations which might be implicated in the low reliabilities. To check these four possibilities we:

1. counted the total number of events for the individual observer of each observer pair by subject area to assess sampling error due to insufficient numbers of observations from one or another observer.
2. counted the number of events observed for each target pupil to assess observer bias in the frequency with which each pupil of the set of target pupils was observed;
3. compared tallies of individual event names for each observer pair to assess observer bias in sampling classroom behavior;

4. inspected source documents to check for congruence between observers in the record of target pupil behavior.

Low reliabilities for five classrooms were directly the result of an insufficient sample of behaviors as reflected in low frequency of observations. Since low frequencies in observational records did not typify the observers who made these observations, we considered the low number of observations to be a function of circumstances or the classroom setting. Consequently, we did not consider the paired-observation data complete enough to estimate reliability. In one classroom, for example, one observer failed to observe the afternoon reading group. The number of his observations was low and the time in which the paired observations were made did not correspond.

Review of the observation records suggests the following possible explanations for the low observed reliabilities which occurred between some observers. (Refer also to Table 86, p. 208.)

1. Slight variations between observers in prose style and/or ability to perceive and record important versus trivial information produced differences in the pattern of quality ratings (the "+," "0," or "-" accompanying the event), even though the events themselves were correctly and reliably recorded; thus the rank order correlations are low. This was true of the pupil events in reading for classroom H and the pupil events in math for classroom I.

2. Variability between observers in ability or willingness to produce precise detailed non-inferential records of ongoing classroom interactions precluded accurate encoding and lowered correlations between observers even though similar behaviors were recorded. This explanation accounts for the low correlations between observers for math teacher

responses in classroom P, for math teacher activities and responses in classroom B, for math pupil events in classroom E, math pupil events and activities in classroom K, and for math teacher responses in classroom M.

3. Variability between observers in the amount of time spent in a particular location (most likely with a particular group) introduced sampling error and produced discrepancies in the frequency with which target children were observed and thereby lowered correlations. This was a likely explanation for the low between-observer correlations for reading pupil events in classrooms T and S.

4. Variability between observers in their understanding of the applicability of certain lexicon terms for items which were encoded at the time of observation and thus not reviewed at the time of encoding by the project staff (for example, contexts) introduced discrepancies into the observation record. This proved to be the case for the reading instructional contexts in classroom R and the math instructional contexts in classroom S.

5. Variability between observers in the total number of events documented also influenced reliability. Classrooms J, K, and E for reading and G and F for math were dropped from the presentation of data because one observer of the pair made too few observations to allow adequate comparisons between observers. This happened, no doubt, because of discrepancies between arrival times or times of observations.

Discussion of Reliability of the APPLE System

The observation error reflected in the reported reliabilities appears to reflect procedural rather than sampling error. Training procedures for reliability studies which include standards for beginning and ending the observation, and procedures for the order of observation of target pupils will reduce procedural error considerably. The data from the BTES project supplies important information on the likelihood of behaviors appearing during reading and mathematics. In future observation training sessions, the most frequently appearing classroom behaviors can be discussed and contrasted, and the observers can be trained to differentiate among similar behaviors such as "Engagement," "Work Habits" and "Academic Performance." Consequently differences in prose style would be less consequential in the encoding process.

Data regarding relative frequency of pupil and teacher behaviors provide a basis for determining the number of observations which are necessary in order to insure adequate sampling of classroom behavior. There should be enough observations so that the least frequently appearing valid observation variable would appear at least once. For example, the number of reading observations for the observer pairs varied from a low of 15 in one classroom to a high of 123 in another, a result of the extent of significant observable teacher and pupil behavior and the length of the reading period. For mathematics instruction, the number of observations in the reliability sub-study varied from 10 to 47, reflecting the shorter periods of time designated for mathematics lessons as well as the lower level of pupil activity during these instructional periods.

The median values reported support the reliability of the APPLE observations. On the basis of the examination of the sources of error in the record, we conclude that the differences in frequencies of classroom behavior reported by the paired observers are biased due to procedural factors primarily, and secondarily to sampling error due to insufficient amount of observation time. The first source of error affects the extent of agreement among observers, but should not affect the reliability of the data base. The second source of error also affects the extent of agreement among observers and could have an affect on the reliability of the data base if we had had only a few teachers in the sample. However, the sample of teachers at each grade was sufficiently large to insure that the observational data can be considered a reliable representation of the classroom behavior in BTES classrooms.

Table 86

Rank Order Correlations of Observer Agreement for BTES APPLE Categories

Classroom	Reading				Mathematics			
	Pupil Events	Instructional Contexts	Teacher Activities	Teacher Responses	Pupil Events	Instructional Contexts	Teacher Activities	Teacher Responses
A	.74	.34	.67	.53	.28	.72	.45	.84
B	.40	.94	.19	.49	.66	.36	-.05*	-.07*
C	.25	.94	.83	.60	.69	.22	1.00	1.00
D	.45	.99	.65	.35	.57	1.00	.42	.63
E	Insufficient data to compute index of observer agreement				.13*	.72	1.00	.82
F	.30	.92	.89	.68	Insufficient data to compute index of observer agreement			
G	.42	.90	.15	.31	Insufficient data to compute index of observer agreement			
H	-.06*	.69	.39	.50	.43	.55	.44	.63
I	.57	.86	.73	.64	.00*	1.00	.51	.85
J	Insufficient data to compute index of observer agreement				.44	.77	.16	.60
K	Insufficient data to compute index of observer agreement				.11*	.22	-.25*	.70
L	.39	.92	.50	.88	.27	.94	.27	.60
M	.48	.44	.47	.43	.37	1.00	.43	.05*
N	.52	.76	.48	.43	.54	.81	.22	.70
O	.50	1.00	.67	.32	.44	.71	.60	.26
P	.23	.59	.56	.57	.21	.74	.30	.00*
Q	.56	.83	.21	.32	.28	.88	.28	1.00
R	.33	-.11	.82	.66	.33	.23	.83	.26
S	.18+	.82	.74	.65	.40	.11*	.32	.80
T	.10+	.74	.30	.45	.53	1.00	.59	.79
Median Correlations	.40	.82	.56	.53	.39	.73	.43	.67
Median Correlations for Classrooms without Identifiable Procedural or Sampling Error	.44	.83	.56	.53	.43	.74	.44	.70

+ = evidence of sampling error
* = evidence of procedural bias

APPENDIX B

Descriptive Statistics for Observation Variables and Time Allocation Measures Stratified by Socioeconomic Status of School Population and Geographic Location of School

The material in Appendix B contains information on measures of central tendency and variability of the APPLE observation variables with respect to the socioeconomic status of the school population and the location of the schools in the BTES project. These data illustrate the similarities and differences among pupil and teacher behaviors in classrooms which differ with respect to key demographic factors. This examination of the APPLE data relative to stratified groups provides another look and a refinement of inferences obtained from the examination of the total sample.

Contrasts Between Prorated Frequencies of Observation Variables for Schools Which Differ with Respect to Socioeconomic Status Level

Pupil events. When the average prorated incidence of observed pupil events in reading was examined for schools with differing socioeconomic status (SES) levels, there was more observable evidence of "+ Oral Reading" in high SES schools (Tables 87 and 88). "+ Number Concepts" was most frequent in high SES schools for second grade, but the average incidence of this event was similar across all schools at fifth grade (Tables 89 and 90). At second grade, "+ Engagement" events were recorded most frequently for the middle SES classrooms in both reading and mathematics instruction. Regardless of area of instruction, the frequencies of the negative behavior events, "- Conduct", "- Inattention", and "- Talking", when aggregated, decreased with increasing SES level at second grade. The SES extremes had the highest combined frequencies of these negative events in fifth grade classrooms.

Contexts. The "Independent-Group" and "Teacher-Group" contexts were most frequent among all SES levels for second grade reading (Table 91). For

Table 87

Average Prorated Incidence of Events Observed in BTES Classrooms
Stratified by SES - Reading - Grade 2

Events	Low-Lower Middle N=15 $\bar{X}$	Median	S.D.	Middle Middle N=16 $\bar{X}$	Median	S.D.	Higher Middle-High N=10 $\bar{X}$	Median	S.D.
+ Academic Performance	5.74	5.92	4.61	4.03	3.30	4.40	4.53	3.55	4.19
+ Attentiveness	5.21	3.80	5.36	4.53	2.70	4.90	4.27	3.05	3.74
+ Direction Following	2.08	1.33	2.54	2.45	.55	4.03	2.35	2.60	2.54
+ Engagement	15.85	12.30	13.23	18.02	15.85	9.27	14.46	15.05	6.88
+ Participation	1.57	.55	1.97	2.53	2.38	2.42	2.55	1.70	3.33
+ Volunteering	2.35	1.65	2.33	1.01	.30	1.62	1.64	1.25	2.07
+ Work Habits	7.49	3.85	10.39	4.96	4.95	4.30	2.99	3.00	2.10
- Conduct	.96	.25	1.86	1.68	.39	2.62	1.57	.90	2.84
- Inattention	6.08	4.45	7.26	4.17	3.05	5.50	4.38	3.30	3.41
- Talking	2.75	1.25	3.82	2.91	1.75	3.84	1.54	1.10	1.39
0 Conduct	2.02	1.33	2.31	1.81	.87	2.90	1.86	1.45	1.77
0 Engagement	1.93	.33	4.13	2.14	.39	4.71	3.94	1.03	8.56
0 Inattention	2.74	1.00	3.92	.69	.23	1.21	1.48	1.60	1.29
0 Work Habits	2.88	2.68	2.61	3.66	2.45	3.76	2.87	.95	4.46
+ Oral Reading	3.63	3.70	2.57	5.66	4.65	5.36	10.32	12.55	5.21
+ Phonic Skill	2.52	.30	4.15	2.34	.30	4.18	2.15	1.25	3.41
+ Reading Comprehension	1.47	.26	2.87	3.90	1.25	7.64	1.42	.20	1.90

Table 88

Average Prorated Incidence of Events Observed in BTES Classrooms
Stratified by SES - Reading - Grade 5

Events	Low-Lower Middle N=21 $\overline{X}$	Median	S.D.	Middle Middle N=18 $\overline{X}$	Median	S.D.	Higher Middle-High N=13 $\overline{X}$	Median	S.D.
+ Academic Performance	5.96	2.69	12.13	3.35	1.20	4.01	5.43	3.03	6.66
+ Attentiveness	6.10	4.05	7.85	6.59	5.20	8.32	5.95	4.53	5.79
+ Direction Following	1.98	.80	2.69	2.44	.95	3.28	2.29	.36	5.99
+ Engagement	24.31	24.15	15.57	24.36	21.95	15.18	27.61	28.10	14.85
+ Participation	.91	.33	1.58	.88	.08	2.23	4.29	.75	9.30
+ Volunteering	1.37	.25	2.48	2.31	.45	3.14	1.35	.53	2.28
+ Work Habits	4.40	2.73	5.15	6.89	4.50	6.64	3.09	2.43	3.74
- Conduct	1.26	.28	2.42	1.25	.40	2.11	1.87	.82	3.11
- Inattention	5.34	4.48	4.06	4.52	4.55	4.22	5.59	3.68	5.73
- Talking	4.07	3.45	4.30	1.52	.19	2.68	3.98	4.53	2.76
0 Conduct	3.02	2.53	2.62	1.46	.19	2.95	2.05	1.10	2.42
0 Engagement	2.14	.15	4.43	3.48	.95	5.12	1.35	.56	1.88
0 Inattention	2.15	.65	3.55	1.54	.80	2.41	4.09	.69	9.06
0 Work Habits	4.03	2.90	6.00	3.42	3.10	3.94	3.25	1.98	3.68
+ Oral Reading	2.96	1.30	3.70	1.99	.40	2.59	4.05	3.53	4.26
+ Phonic Skill	1.31	.42	3.11	1.05	.48	2.47	.25	.14	.92
+ Reading Comprehension	1.81	.49	2.54	1.42	.41	2.27	.12	.07	.44

Table 89

Average Prorated Incidence of Events Observed in BTES Classrooms
Stratified by SES - Mathematics - Grade 2

Events	Low-Lower Middle N= 15			Middle Middle N=16			Higher Middle-High N=10		
	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
+ Academic Performance	.18	.10	.70	1.34	.17	4.32	.61	.21	1.20
+ Attentiveness	4.39	1.30	6.28	8.56	6.45	9.02	3.07	3.70	2.45
+ Direction Following	2.55	.15	6.58	1.58	.32	2.95	2.46	.55	3.67
+ Engagement	8.40	2.68	10.88	15.49	12.90	13.81	11.66	10.35	4.82
+ Participation	1.27	.50	2.22	3.45	.30	8.76	2.25	.17	4.93
+ Volunteering	1.20	.63	1.81	2.28	.93	3.24	3.38	1.70	4.32
+ Work Habits	8.89	6.63	12.00	6.81	6.00	6.36	6.80	8.30	3.94
- Conduct	1.55	.20	2.98	1.11	.23	2.04	.78	.27	1.13
- Inattention	4.21	3.25	4.40	5.23	1.85	6.85	2.96	3.10	2.51
- Talking	4.61	1.40	6.98	1.44	.51	2.10	3.12	2.00	3.33
0 Conduct	1.19	.30	2.61	1.09	.21	2.03	3.07	2.85	2.90
0 Engagement	1.24	.50	1.96	1.59	.30	3.13	2.16	.37	4.91
0 Inattention	2.39	.25	6.17	1.32	.42	2.11	.97	.33	1.63
0 Work Habits	3.25	.92	4.85	3.13	1.45	3.54	3.04	1.90	4.27
+ Number Concepts	8.63	3.75	10.03	11.08	6.30	11.83	24.30	24.00	11.02
- Number Concepts	4.17	2.08	5.42	2.31	.45	2.96	5.41	2.75	8.01
0 Number Concepts	1.74	1.05	2.27	3.83	1.05	9.00	2.96	1.85	3.38

Table 90

Average Prorated Incidence of Events Observed in BTES Classrooms
Stratified by SES - Mathematics - Grade 5

Events	Low-Lower Middle N=21			Middle Middle N=18			Higher Middle-High N=13		
	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
+ Academic Performance	.26	.11	.67	.26	.14	1.11	.52	.24	1.10
+ Attentiveness	4.43	2.29	5.59	7.69	3.50	10.22	7.88	5.80	8.11
+ Direction Following	1.64	.59	2.07	2.16	.37	4.08	1.22	.44	2.81
+ Engagement	21.47	19.85	14.81	15.94	14.45	15.51	20.43	18.30	12.36
+ Participation	1.36	.14	2.56	.53	.11	1.84	1.39	.69	1.70
+ Volunteering	1.31	.32	1.57	2.35	.76	3.12	1.71	1.05	1.94
+ Work Habits	5.70	4.53	5.50	5.77	4.05	5.92	5.15	4.73	5.07
- Conduct	1.27	.25	2.05	.76	.09	2.08	2.22	1.03	3.29
- Inattention	6.83	5.60	6.63	3.72	3.05	4.05	6.65	6.85	5.13
- Talking	3.12	.82	5.38	5.51	1.85	8.54	3.47	2.73	3.77
0 Conduct	2.14	1.14	2.75	.82	.26	1.73	.99	.50	1.37
0 Engagement	1.11	.09	3.53	1.32	.61	1.84	1.12	.40	2.05
0 Inattention	2.07	.85	2.45	2.29	.45	7.81	1.32	.47	2.20
0 Work Habits	5.58	4.03	5.53	4.84	.95	9.25	3.57	2.38	4.12
+ Number Concepts	9.95	8.18	9.06	9.17	7.40	9.16	9.79	7.80	9.10
- Number Concepts	1.58	.26	2.43	1.98	.36	3.44	3.11	.94	4.38
0 Number Concepts	1.84	.84	2.46	1.82	.45	2.84	1.79	.97	2.48

Table 91

Average Prorated Incidence of Contexts Observed in BTES Classrooms Stratified by SES - Reading - Grade 2

Contexts	Low-Lower Middle N=15 $\overline{X}$	Low-Lower Middle N=15 Median	Low-Lower Middle N=15 S.D.	Middle Middle N=16 $\overline{X}$	Middle Middle N=16 Median	Middle Middle N=16 S.D.	Higher Middle-High N=10 $\overline{X}$	Higher Middle-High N=10 Median	Higher Middle-High N=10 S.D.
Adult Group	7.63	2.27	13.76	9.80	.93	16.89	3.44	.75	8.33
Independent Class	9.01	2.65	16.03	5.46	.40	10.48	7.61	4.65	2.63
Independent Group	28.67	27.56	19.25	31.28	33.05	18.06	25.33	26.90	14.42
Independent Individual	3.77	.16	11.86	8.73	.48	16.81	1.20	.80	1.58
Teacher Class	14.99	4.75	22.48	4.46	.72	8.76	5.91	2.55	6.99
Teacher Group	25.21	27.10	19.57	34.68	30.95	17.44	40.12	42.95	17.82

fifth grade reading (Table 92), "Independent-Class" instruction was most common in the high SES schools, while "Independent-Group" contexts were more frequently reported for low and middle SES classrooms. Instruction of the total class, either in teacher-conducted or independent work sessions was observed more frequently in fifth grade high SES classrooms. Classroom work independent of teacher direction increased with grade level for all SES groups.

"Teacher-Class," "Independent-Group," and "Independent-Class" instruction generally predominated in mathematics lessons (Tables 93 and 94). "Teacher-Group" contexts appeared more frequently at the middle than at low or high SES schools. Individualized instruction, while relatively rare overall, occurred most frequently in second grade classrooms of middle SES schools. There was relatively little "Adult-Group" instruction in mathematics except in low SES second grade classrooms. In general, the differing frequencies of observed instructional context with respect to grade level and SES probably does reflect real differences in instructional approach in these schools.

Teacher activities. "Working With" was the most frequently occurring teacher activity across all SES, grade, and instructional levels. However, teachers in the middle SES classrooms were observed more frequently than those in low or high SES classrooms "Working With" groups or individuals in reading and mathematics at second grade (Tables 95 and 97). In fifth grade, "Working With" was most frequently observed in low SES classrooms in reading and in high SES classrooms in mathematics (Tables 96 and 98). "Circulating" and "Asking" were common teacher activities during reading instruction in low SES classrooms. "Circulating" also occurred with considerable frequency in the middle SES classes, particularly in fifth

Table 92

Average Prorated Incidence of Contexts Observed in BTES Classrooms
Stratified by SES - Reading - Grade 5

	Low-Lower Middle N=21			Middle Middle N=18			Higher Middle-High N=13		
Contexts	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Adult Group	2.61	1.33	6.61	.54	.13	1.87	0	0	0
Independent Class	12.62	3.28	19.17	19.39	2.80	29.28	31.43	25.43	27.98
Independent Group	40.00	37.63	18.47	33.77	37.85	20.42	21.00	16.90	22.71
Independent Individual	2.75	.25	6.67	1.21	.24	3.18	6.33	.42	17.20
Teacher Class	8.39	4.63	11.05	8.30	1.30	11.97	24.63	12.15	28.37
Teacher Group	28.18	31.73	20.33	24.28	20.35	21.44	15.23	5.95	19.95

Table 93

Average Prorated Incidence of Contexts Observed in BTES Classrooms
Stratified by SES - Mathematics - Grade 2

Contexts	Low-Lower Middle N=15			Middle Middle N=16			Higher Middle-High N=10		
	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Adult Group	8.63	1.62	19.06	1.99	.37	4.64	.57	.32	1.80
Independent Class	6.75	2.55	12.77	17.96	9.70	22.16	14.68	4.45	24.27
Independent Group	22.27	18.60	21.98	22.91	23.75	19.71	21.83	19.60	19.42
Independent Individual	3.46	.38	9.33	6.28	.88	15.22	1.01	.63	1.36
Teacher Class	25.29	7.96	35.12	22.09	15.25	24.23	50.67	53.70	30.36
Teacher Group	10.91	4.23	17.86	21.20	10.15	26.26	7.28	.27	14.33

Table 94

Average Prorated Incidence of Contexts Observed in BTES Classrooms
Stratified by SES - Mathematics - Grade 5

	Low-Lower Middle N=21			Middle Middle N=18			Higher Middle-High N=13		
Contexts	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Adult Group	1.59	.83	7.27	0	0	0	0	0	0
Independent Class	24.49	8.73	30.21	24.98	6.55	32.11	34.67	35.05	30.54
Independent Group	24.74	15.10	26.26	20.44	17.65	23.41	21.29	7.23	26.88
Independent Individual	2.19	.13	6.58	0	0	0	.48	.23	.98
Teacher Class	23.92	13.75	28.66	13.95	1.28	21.62	25.75	21.50	26.54
Teacher Group	12.21	1.18	18.45	15.06	1.52	23.02	11.83	2.06	18.64

Table 95

Average Prorated Incidence of Teacher Activities Observed in
BTES Classrooms Stratified by
SES - Reading - Grade 2

	Low-Lower Middle			Middle Middle			Higher Middle-High		
		N = 15			N = 16			N = 10	
Activities	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Academic Organizing	2.93	1.25	3.54	2.99	1.70	4.27	3.32	2.95	4.45
Answering	.29	.06	.67	1.33	.24	4.50	.13	.07	.41
Asking	7.36	3.40	12.41	5.51	4.65	5.05	6.64	5.15	5.83
At Desk	.88	.22	2.71	0	0	0	.30	.15	.65
At Board	4.05	.17	10.64	0	0	0	.40	.28	.65
Checking	1.41	.09	2.89	2.55	.18	5.71	4.55	3.15	5.58
Circulating	9.98	.11	25.63	3.26	.81	6.77	.78	.30	1.40
Discussion	3.28	.23	7.55	.55	.11	.95	1.31	.20	1.86
Explaining	.25	.08	.59	.55	.17	1.47	.72	.30	.92
Helping	3.55	1.38	5.56	5.24	.93	9.37	1.21	.20	2.19
Instruction Giving	2.72	.68	4.65	1.41	.43	2.24	3.09	2.25	3.65
Listening	2.33	.60	3.29	.97	.43	1.25	5.19	4.05	4.89
Question & Answer	1.27	.35	2.32	1.51	.08	3.59	1.49	.50	2.03
Supervising	2.64	.09	7.23	1.02	.17	2.56	.56	.17	.81
Working With	38.06	43.80	29.33	57.55	61.75	21.27	41.80	46.10	27.88

Table 96

Average Prorated Incidence of Teacher Activities Observed in BTES Classrooms Stratified by SES - Reading - Grade 5

Activities	Low-Lower Middle N = 21			Middle Middle N = 18			Higher Middle-High N = 13		
	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Academic Organizing	1.85	.55	3.04	2.40	.15	5.34	3.85	.69	6.81
Answering	5.32	.71	14.11	3.10	.74	10.58	1.18	.48	2.39
Asking	5.07	3.48	5.27	4.41	2.25	5.19	3.98	1.03	7.01
At Desk	2.89	.18	6.87	3.92	.49	9.44	12.94	.69	24.32
At Board	1.10	.10	2.46	1.18	.09	3.50	.25	.15	.60
Checking	4.06	.73	7.12	4.17	.95	8.75	7.45	2.50	15.07
Circulating	6.00	.95	9.32	11.02	.24	23.56	4.04	.90	5.94
Discussion	5.02	.89	9.06	5.03	.32	11.23	1.52	.45	3.78
Explaining	1.48	.15	2.26	.96	.12	2.87	2.07	.25	6.69
Helping	4.[illegible]7	1.28	8.06	1.28	.25	2.89	5.52	2.83	7.38
Instruction Giving	3.17	1.85	4.50	5.04	3.65	6.84	.87	.36	1.61
Listening	.82	.26	1.82	1.31	.60	1.98	3.80	.69	6.66
Question & Answer	3.83	.45	9.89	5.76	.99	8.38	2.38	1.29	8.57
Supervising	4.30	.46	9.58	2.95	.33	5.48	.50	.15	1.39
Working With	35.35	30.20	26.68	29.58	26.55	22.61	28.13	19.80	27.61

Table 97

Average Prorated Incidence of Teacher Activities Observed in BTES Classrooms Stratified by SES - Mathematics - Grade 2

	Low-Lower Middle			Middle Middle			Higher Middle-High		
	N = 15			N = 16			N = 10		
Activities	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Academic Organizing	2.29	.27	4.05	2.34	.35	4.54	1.14	.70	1.47
Answering	.22	.12	.85	3.31	1.26	9.60	.14	.08	.44
Asking	5.68	.70	10.66	4.06	2.15	4.91	7.07	6.75	8.15
At Desk	0	0	0	.89	.48	3.58	.41	.23	1.30
At Board	2.83	.91	5.95	6.97	1.11	13.00	4.53	.95	8.58
Checking	.39	.21	1.50	9.93	1.91	15.41	10.95	13.10	8.83
Circulating	21.31	1.60	33.67	7.67	1.52	13.87	6.12	2.10	7.56
Discussion	6.28	.52	22.54	0	0	0	.41	.23	1.30
Explaining	1.46	.31	3.11	2.84	.72	6.30	1.85	.57	2.86
Helping	4.64	.70	9.93	5.64	1.44	8.67	5.05	.40	11.71
Instruction Giving	2.83	.53	5.01	3.56	.70	4.89	2.07	1.55	2.36
Listening	.35	.06	1.14	.09	.05	.35	0	0	0
Question & Answer	1.51	.15	3.95	1.64	.34	4.50	1.30	.72	4.11
Supervising	2.71	.38	5.62	2.26	.83	4.25	3.33	.49	6.86
Working With	26.71	18.30	28.21	31.41	23.20	26.72	30.10	27.56	21.33

Table 98

Average Prorated Incidence of Teacher Activities Observed in
BTES Classrooms Stratified by
SES - Mathematics - Grade 5

	Low-Lower Middle			Middle Middle			Higher Middle-High		
	N = 21			N = 18			N = 13		
Activities	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Academic Organizing	1.09	.55	1.50	1.78	.44	3.68	2.51	.81	3.31
Answering	1.74	.11	4.24	3.37	.81	11.50	4.04	.40	9.93
Asking	5.26	.85	7.41	3.59	.89	5.28	3.35	.50	7.75
At Desk	7.95	.27	18.06	4.59	2.54	13.36	4.55	1.01	10.69
At Board	2.19	.31	3.26	1.24	.28	3.19	1.35	.18	2.89
Checking	6.02	.68	10.37	6.24	.92	14.16	10.10	4.68	11.49
Circulating	12.67	4.45	15.77	3.51	.83	7.97	6.92	3.18	8.66
Discussion	.79	.20	2.44	.96	.26	2.11	.29	.16	.70
Explaining	2.42	.78	4.01	5.07	.56	15.92	5.45	1.50	9.19
Helping	7.23	1.68	10.01	7.73	.95	13.81	7.69	7.63	7.97
Instruction Giving	3.50	2.15	3.97	1.21	.29	2.29	5.06	.47	15.50
Listening	0	0	0	.19	.10	.83	.33	.18	1.19
Question & Answer	1.61	.53	5.55	.90	.28	2.31	3.00	.29	6.98
Supervising	4.31	.14	11.42	1.34	.70	3.13	1.46	.72	2.90
Working With	23.36	22.30	18.90	21.06	11.35	21.85	24.73	15.55	27.56

grade. "Checking" appeared frequently only for the high SES groups. The "At Desk" activity was more frequent generally in the fifth grade than second grade, and most frequent for high SES groups during reading.

In mathematics instruction, "Circulating" was common at all levels except for the middle SES fifth grade classes. At second grade level, "Checking" student work was frequent for middle and high SES groups, but was observed with very low frequency for the low SES classes. Both "Checking" and "Helping" were frequent across SES levels at fifth grade, and "At Desk" was also frequent for the low SES classrooms.

Teacher responses. Teacher responses were observed to vary little between second and fifth grade classrooms and between reading and mathematics. In the examination of possible differences in teacher responses with respect to SES level of schools, the data presented in Tables 99 through 102 are of interest. For second grade reading, "Positive Feedback" and "Praise" were at about the same level across all SES groups. In reading instruction at the fifth grade, "Positive Feedback" and "Praise" were higher at the high SES level than for either the middle or low SES groups. "Negative Feedback" in reading, while occurring with rare frequency, occurred most in the middle SES classes at both second and fifth grade. "Disciplining" responses were most frequent for high SES reading instruction at both grade levels, while "Teacher Help" was more characteristic of the low SES classes, particularly in second grade.

"Positive Feedback" was observed to occur least frequently in the second grade low SES mathematics lessons. The frequency of "Positive Feedback," "Praise" and "Negative Feedback" was consistently higher in the high SES groups at this grade level. In fifth grade mathematics instruction, middle SES had the lowest frequency of either positive or negative feedback.

Table 99

Average Prorated Incidence of Teacher Responses Observed in
BTES Classrooms Stratified by
SES - Reading - Grade 2

	Low-Lower Middle			Middle Middle			Higher Middle-High		
	N = 15			N = 16			N = 10		
Responses	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Instructing	2.15	.75	3.17	4.36	3.50	3.79	6.37	4.65	5.72
Disciplining	1.19	.11	3.55	1.73	.30	3.39	3.08	2.00	2.97
Teacher Help	3.03	2.85	2.54	1.64	1.80	1.54	2.32	2.65	1.87
Ignoring	1.57	.44	2.27	2.03	.48	4.31	2.76	2.55	2.95
Moves On	1.43	.26	2.81	1.09	.30	1.92	1.29	.90	1.34
Negative Feedback	.16	.08	.43	.68	.27	1.96	.58	.28	1.05
None	66.51	71.98	17.41	66.39	66.00	11.84	48.70	53.55	19.19
Positive Feedback	7.39	6.45	6.91	6.88	5.40	6.40	6.82	7.65	3.70
Praise	3.87	3.11	4.45	2.03	.50	2.89	3.86	1.65	4.01
Questioning	2.31	.78	4.55	2.49	2.30	2.66	2.63	2.90	2.39
Recognizing	2.33	2.15	2.30	1.16	.45	1.84	1.46	.90	1.64
Redirecting	4.57	3.50	4.20	2.08	2.00	1.98	4.03	3.60	2.80

Table 100

Average Prorated Incidence of Teacher Responses Observed in
BTES Classrooms Stratified by
SES - Reading - Grade 5

	Low-Lower Middle N = 21			Middle Middle N = 18			Higher Middle-High N = 13		
Responses	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Instructing	1.67	.73	2.12	4.53	1.95	7.44	3.32	3.18	2.97
Disciplining	.87	.06	2.23	.26	.09	.55	1.62	1.50	1.67
Teacher Help	1.90	.88	2.69	1.71	.50	2.55	1.82	1.25	2.30
Ignoring	2.63	1.90	3.20	.81	.15	1.47	1.84	.40	4.09
Moves On	.95	.15	1.41	1.27	.55	2.01	.25	.14	.92
Negative Feedback	.11	.03	.35	.66	.04	2.18	.19	.10	.67
None	68.18	69.93	20.30	67.09	66.95	21.20	62.91	64.63	13.82
Positive Feedback	5.23	4.58	5.05	5.21	5.05	4.51	8.83	4.55	11.35
Praise	1.97	1.00	2.90	1.39	.33	3.06	2.79	1.50	3.82
Questioning	1.11	.15	1.80	.60	.12	1.31	1.64	.59	2.83
Recognizing	1.56	.53	2.44	3.13	1.85	3.71	2.96	2.85	2.29
Redirecting	2.16	1.43	2.46	3.94	3.30	4.54	3.62	2.70	4.38

Table 101

Average Prorated Incidence of Teacher Responses Observed in
BTES Classrooms Stratified by
SES - Mathematics - Grade 2

	Low-Lower Middle N = 16			Middle Middle N = 15			Higher Middle-High N = 10		
Responses	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Instructing	1.95	.53	2.95	5.36	3.70	6.34	4.31	3.30	3.69
Disciplining	1.73	.43	3.07	.51	.23	1.39	1.92	.50	2.88
Teacher Help	2.15	.85	2.97	4.21	4.00	4.44	3.75	3.05	3.20
Ignoring	1.24	.15	2.89	2.36	.70	3.45	4.31	3.85	4.18
Moves On	.40	.21	1.06	.14	.07	.40	.56	.33	.78
Negative Feedback	.25	.09	.70	.08	.04	.33	.64	.26	1.45
None	66.61	69.88	21.41	67.89	69.95	13.97	58.68	56.35	10.85
Positive Feedback	2.32	.70	4.09	6.35	5.40	7.09	11.79	12.25	9.41
Praise	2.81	.53	4.67	1.32	.54	1.82	3.30	.55	4.74
Questioning	1.03	.45	1.89	2.66	.16	8.83	1.00	.55	1.20
Recognizing	3.65	1.00	4.95	1.68	.30	3.10	1.73	.50	2.32
Redirecting	3.74	.88	5.33	2.77	1.95	2.96	3.64	4.20	2.46

Table 102

Average Prorated Incidence of Teacher Responses Observed in
BTES Classrooms Stratified by
SES - Mathematics - Grade 5

Responses	Low-Lower Middle N = 21 $\bar{X}$	 Median	 S.D.	Middle Middle N = 18 $\bar{X}$	 Median	 S.D.	HIgher Middle-High N = 13 $\bar{X}$	 Median	 S.D.
Instructing	3.30	2.25	3.32	4.00	2.80	5.09	2.41	1.58	3.18
Disciplining	.91	.18	1.58	.89	.23	1.58	1.52	.33	3.16
Teacher Help	2.12	.68	3.12	2.06	.60	3.33	4.07	2.50	4.49
Ignoring	2.82	1.88	4.22	3.18	2.45	4.23	2.39	.69	4.39
Moves On	.62	.18	1.13	.29	.16	1.25	.41	.09	1.20
Negative Feedback	.15	.08	.70	.05	.03	.21	1.31	.81	1.58
None	72.02	74.61	19.00	64.01	70.30	26.36	65.03	69.15	16.68
Positive Feedback	4.05	2.15	4.69	2.52	.45	4.53	5.09	4.50	5.21
Praise	1.62	.36	2.82	.50	.26	.99	1.65	1.15	2.47
Questioning	.92	.25	1.72	.34	.19	.78	.29	.15	.72
Recognizing	1.93	1.18	2.33	4.00	2.10	7.77	3.32	2.33	3.88
Redirecting	1.78	1.90	1.98	1.77	.36	2.59	2.47	1.51	2.96

The frequency of "Positive Feedback" and "Praise" in the low SES classes was exceeded only slightly by that of the high SES groups. In mathematics, "Disciplining" was observed more frequently in the high rather than middle or low SES classrooms. While "Teacher Help" and moderate levels of feedback to pupils are present in the low SES rooms, the greatest amount of "Positive Feedback" and "Praise" are associated with the high SES schools.

Contrasts Between Prorated Frequencies of Observation Variables for Urban, Suburban and Rural Schools

Pupil events. When the average prorated frequencies of pupil events were computed for the BTES classrooms according to whether they were located in urban, suburban or rural areas, the results indicated little difference among the schools in pupil events in reading at second and fifth grade (Tables 103 and 104). In mathematics, there were more marked differences in the frequency of different types of observed pupil behavior. For example, second grade pupils in rural schools (Table 105) were observed least frequently manifesting "+ Engagement" behavior and observed most in "+ Work Habits," possibly reflecting differences in instructional approaches of the teachers with respect to requirements for completing mathematics assignments. There was a much higher incidence of "+ Number Concepts" in the rural second grade classrooms. When the incidence of all of the negative behavior events ("- Conduct," "- Inattention" and "- Talking") were combined, the frequency was considerably lower in second grade classrooms located in urban areas.

The incidence of types of pupil behavior in fifth grade mathematics (Table 106) was fairly similar across all behaviors and school locations

Table 103

Average Prorated Incidence of Events Observed in Classrooms
Stratified by Location - Reading - Grade 2

	Urban N=22			Suburban N=13			Rural N=6		
Events	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
+ Academic Performance	5.85	5.30	5.25	3.32	2.79	2.48	3.97	4.30	3.45
+ Attentiveness	5.35	3.90	5.19	2.83	1.93	3.14	6.48	5.90	5.23
+ Direction Following	2.28	.50	3.61	2.20	1.15	2.95	2.53	2.75	1.74
+ Engagement	14.71	12.95	9.33	18.34	16.40	11.56	18.12	19.30	11.75
+ Participation	1.78	.25	2.42	3.01	2.45	2.99	1.87	1.95	1.25
+ Volunteering	1.78	1.40	1.88	1.13	.58	1.88	2.35	1.05	2.96
+ Work Habits	5.14	3.60	7.49	6.47	4.79	7.60	4.08	4.85	3.47
- Conduct	.84	.29	1.35	1.96	.60	3.39	2.15	1.25	2.75
- Inattention	5.28	3.50	7.01	3.91	3.43	3.01	5.78	5.25	5.78
- Talking	2.75	1.15	3.80	2.24	1.40	3.06	2.30	1.50	2.79
0 Conduct	1.98	1.10	2.72	2.05	1.71	2.10	1.27	.60	1.90
0 Engagement	2.07	.42	3.61	4.09	.56	8.77	.65	.60	.72
0 Inattention	1.91	.42	3.36	1.25	1.40	1.21	1.48	1.00	2.32
0 Work Habits	3.11	2.20	3.31	3.57	2.03	4.56	2.62	3.00	1.40
+ Oral Reading	5.28	4.10	4.89	6.65	5.35	5.88	7.60	6.35	4.25
+ Phonic Skill	2.92	.45	4.37	1.62	.60	2.65	1.90	1.14	4.65
+ Reading Comprehension	3.25	.50	6.67	.90	.17	1.19	2.58	.90	4.13

Table 104

Average Prorated Incidence of Events Observed in Classrooms
Stratified by Location - Reading - Grade 5

	Urban N=25			Suburban N=14			Rural N=14		
Events	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
+ Academic Performance	4.68	3.88	4.80	4.71	1.20	6.45	5.21	.50	14.54
+ Attentiveness	7.97	6.55	7.52	4.69	3.65	4.52	4.23	.38	9.05
+ Direction Following	2.77	1.43	4.59	2.59	.25	5.97	2.21	.38	3.26
+ Engagement	23.19	22.88	13.44	28.56	24.95	17.90	24.58	25.25	14.77
+ Participation	1.29	.31	3.32	1.70	.15	3.13	3.60	.36	8.93
+ Volunteering	2.52	.90	3.22	1.36	.18	2.90	1.16	.22	2.16
+ Work Habits	4.40	3.25	4.85	5.53	3.95	5.49	5.31	.65	6.78
- Conduct	1.49	.30	2.75	1.34	.31	2.66	1.23	.67	1.76
- Inattention	4.91	4.01	4.40	5.02	3.20	5.20	5.24	5.10	4.35
- Talking	3.22	1.88	3.95	3.84	4.60	2.89	2.17	.38	3.56
0 Conduct	2.29	1.35	3.01	2.37	1.45	2.65	1.85	.90	2.37
0 Engagement	2.22	.14	4.53	3.67	2.50	5.14	1.29	.58	1.91
0 Inattention	1.14	.24	2.38	1.66	1.20	2.00	5.29	1.55	8.95
0 Work Habits	3.87	1.93	5.70	4.34	4.10	4.27	2.21	1.43	2.92
+ Oral Reading	3.56	2.90	3.65	2.97	1.70	3.74	1.80	.28	2.97
+ Phonic Skill	1.42	.52	2.98	.56	.30	2.11	.44	.24	1.66
+ Reading Comprehension	1.88	.63	2.52	.26	.11	.71	1.03	.26	2.17

Table 105

Average Prorated Incidence of Events Observed in Classrooms
Stratified by Location - Mathematics - Grade 2

	Urban			Suburban			Rural		
	N=22			N=13			N=6		
Events	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
+ Academic Performance	.059	.031	.28	2.23	.68	4.71	0	0	0
+ Attentiveness	7.47	4.65	8.68	3.92	3.15	4.94	3.03	1.80	3.73
+ Direction Following	1.78	.12	5.17	3.41	.73	4.70	.77	.55	.94
+ Engagement	12.08	6.50	14.09	13.66	13.20	7.07	7.87	9.55	6.44
+ Participation	2.90	.47	7.60	2.19	.25	4.40	.77	.55	1.19
+ Volunteering	1.82	.71	2.75	2.58	.97	4.02	2.43	1.70	2.89
+ Work Habits	4.32	3.50	4.67	10.54	8.45	11.10	13.07	11.30	8.21
- Conduct	1.22	.15	2.63	.70	.25	1.07	2.15	1.10	2.64
- Inattention	3.51	.65	4.65	4.73	4.43	3.81	6.27	3.00	8.89
- Talking	2.20	.54	4.40	4.90	2.50	5.94	1.92	1.10	2.38
0 Conduct	1.70	.45	2.67	2.02	.63	2.86	.38	.28	.60
0 Engagement	1.63	.37	2.89	1.65	.22	4.36	1.37	.55	1.92
0 Inattention	2.36	.33	5.24	.79	.22	1.52	.77	.58	1.19
0 Work Habits	2.38	.73	3.79	3.88	2.69	4.31	4.40	4.05	5.06
+ Number Concepts	10.56	7.75	9.75	14.34	13.33	13.24	21.83	23.80	17.33
- Number Concepts	3.72	1.71	4.97	4.19	2.35	7.32	2.88	2.55	1.63
0 Number Concepts	3.47	1.75	7.87	2.07	1.20	2.47	2.30	1.75	2.61

Table 106

Average Prorated Incidence of Events Observed in Classrooms
Stratified by Location - Mathematics - Grade 5

Events	Urban N=25 $\overline{X}$	Urban N=25 Median	Urban N=25 S.D.	Suburban N=14 $\overline{X}$	Suburban N=14 Median	Suburban N=14 S.D.	Rural N=14 $\overline{X}$	Rural N=14 Median	Rural N=14 S.D.
+ Academic Performance	.33	.16	1.16	.23	.13	.58	.39	.18	.80
+ Attentiveness	9.02	8.43	7.23	2.34	.76	4.87	5.80	2.40	10.23
+ Direction Following	2.00	.63	3.10	.92	.26	2.69	1.86	.49	3.26
+ Engagement	18.54	16.80	11.51	19.31	17.80	17.03	20.44	16.60	16.75
+ Participation	1.56	.20	2.52	.58	.22	1.28	1.05	.44	2.30
+ Volunteering	2.52	2.23	2.75	1.06	.53	1.56	1.01	.28	1.55
+ Work Habits	6.06	4.56	5.53	3.97	3.05	4.84	7.14	6.05	6.34
- Conduct	.95	.16	2.03	2.25	.34	3.24	.99	.45	2.02
- Inattention	4.26	3.15	4.11	6.19	3.55	7.64	7.40	8.10	5.23
- Talking	2.60	1.65	3.20	5.29	2.45	8.84	5.44	1.90	7.27
0 Conduct	2.08	.73	3.04	.98	.32	1.84	1.30	.36	2.13
0 Engagement	1.20	.16	3.26	1.32	.53	2.10	.92	.52	1.86
0 Inattention	1.83	.32	2.43	3.33	.75	8.72	2.36	.95	2.88
0 Work Habits	4.85	3.33	6.26	5.51	2.65	8.66	4.93	3.55	6.34
+ Number Concepts	11.10	10.63	9.37	8.42	5.85	8.93	8.37	6.40	7.99
- Number Concepts	1.84	.32	2.54	1.44	.25	3.01	3.07	.71	4.64
0 Number Concepts	1.36	.32	2.11	1.66	.71	2.24	2.69	1.65	3.35

with some exceptions. "+ Attentiveness" and pupil events which were evidence of "+ Number Concepts" were highest in the urban classrooms. However, when all of the number concept events were combined, there were frequent occurrences of behaviors associated with evidence of arithmetical concepts, positive, negative and neutral, in the rural classrooms. As in second grade mathematics classes, negative pupil behaviors were least frequent, on the whole, in the fifth grade urban classes.

Contexts. "Teacher-Group" contexts were the most common for reading instruction in all locations, followed by "Independent-Group" contexts. There were greater frequencies of pupil behavior in the "Independent-Individual" contexts in the urban classrooms at second grade (Table 107). Instruction in groups by an adult other than the teacher was most frequent, though relatively rare overall, in the suburban second grade reading program.

"Teacher-Class" and "Independent-Group" contexts were prominent styles of organization for instruction in mathematics at second grade (Table 109). The "Teacher-Group" and "Independent-Individual" contexts were least prevalent in rural areas, suggesting that there might have been less individualization of mathematics instruction in these schools. The relatively higher frequency in rural areas of "Teacher-Class" and "Independent-Class" contexts would tend to support this conclusion. On the other hand, "Independent-Individual" and "Independent-Group" work had the highest relative frequency in second grade suburban mathematics instruction, leading to a tentative hypothesis that individualized instruction in second grade mathematics was most common in suburban classrooms and least common in schools located in rural areas.

Table 107

Average Prorated Incidence of Instructional Contexts Observed in Classrooms Stratified by Location - Reading - Grade 2

	Urban N=22			Suburban N=13			Rural N=6		
Contexts	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Adult Group	6.43	1.44	12.81	10.29	1.80	18.18	5.10	2.95	6.76
Independent Class	4.29	.23	8.77	10.72	4.58	15.69	10.80	4.20	13.94
Independent Group	32.28	35.10	19.62	22.58	23.90	11.05	30.00	36.20	19.21
Independent Individual	14.94	.31	13.48	7.58	.26	14.66	.17	.10	.40
Teacher Class	11.25	3.10	19.64	6.23	1.48	8.47	4.45	1.60	8.22
Teacher Group	36.06	42.55	18.10	27.69	26.90	20.35	30.15	29.10	18.81

Table 108

Average Prorated Incidence of Instructional Contexts Observed in Classrooms Stratified by Location - Reading - Grade 5

Contexts	Urban N=25 $\overline{X}$	Urban N=25 Median	Urban N=25 S.D.	Suburban N=14 $\overline{X}$	Suburban N=14 Median	Suburban N=14 S.D.	Rural N=14 $\overline{X}$	Rural N=14 Median	Rural N=14 S.D.
Adult Group	1.73	.19	4.80	1.52	.82	5.69	0	0	0
Independent Class	9.08	1.14	2.74	35.21	32.00	29.80	22.36	21.15	25.23
Independent Group	38.47	36.88	19.13	23.13	20.30	21.39	31.46	32.40	23.04
Independent Individual	1.79	.16	4.38	7.79	.71	17.29	.57	.15	1.69
Teacher Class	7.19	.87	13.19	17.36	10.00	22.49	15.93	6.00	20.26
Teacher Group	38.14	36.80	20.40	12.14	2.45	17.78	13.01	15.95	13.84

Table 109

Average Prorated Incidence of Instructional Contexts Observed in Classrooms Stratified by Location - Mathematics - Grade 2

Contexts	Urban N=22 $\overline{X}$	 Median	 S.D.	Suburban N=13 $\overline{X}$	 Median	 S.D.	Rural N=6 $\overline{X}$	 Median	 S.D.
Adult Group	4.10	.24	14.43	4.79	1.10	11.05	2.43	1.43	3.90
Independent Class	10.97	1.52	19.35	10.23	4.93	12.62	26.83	17.25	31.13
Independent Group	18.10	13.05	19.20	32.50	33.00	20.89	16.38	18.60	14.60
Independent Individual	3.34	.31	11.74	6.42	.59	12.38	.93	.55	1.50
Teacher Class	30.27	16.00	34.69	28.89	20.58	30.18	32.98	24.25	27.23
Teacher Group	17.01	3.58	25.36	13.92	2.70	17.02	3.38	.85	6.76

Table 110

Average Prorated Incidence of Instructional Contexts Observed in Classrooms Stratified by Location - Mathematics - Grade 5

	Urban N=22			Suburban N=14			Rural N=14		
Contexts	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Adult Group	0	0	0	2.38	1.28	8.90	0	0	0
Independent Class	17.62	2.68	25.34	34.24	26.83	34.07	36.91	42.80	31.80
Independent Group	25.50	22.60	22.96	22.06	3.20	28.53	17.54	3.15	25.09
Independent Individual	.75	.08	3.01	2.38	.30	7.18	0	0	0
Teacher Class	26.11	22.58	27.91	16.36	2.85	25.84	17.91	8.15	21.98
Teacher Group	21.41	16.80	22.57	2.65	.52	7.19	8.18	.72	16.78

In fifth grade, with the exception of urban areas, learning activities were carried on independently of direct teacher involvement in over fifty percent of the observations (Tables 108 and 110). While almost half of the instruction in the urban fifth grade mathematics classes was "Independent-Class" or "Independent-Group," "Teacher-Class" and "Teacher-Group" instruction characterized the remainder of the observations at a much higher level than all teacher-directed learning in mathematics in suburban or rural areas. Evidence of individualized assignments, while infrequent, generally were highest in the schools located in the suburban areas for both reading and mathematics.

Teacher activities. The tables summarizing teacher activities (Tables 111 through 114) provide evidence about consistency of teacher behavior across geographic location, grade and instructional area. In comparison with other activities, "Working With" was observed most frequently in all groups. However, teachers in urban classrooms always had relatively higher prorated frequencies of "Working With" activities than teachers in suburban and rural classrooms. These urban teachers were next most frequently observed in "Asking" activities in reading, and in "Circulating" and being "At Desk" or "At Board" in mathematics. Except for second grade reading instruction in rural areas, suburban and rural teachers were observed in next order of frequency to be "Circulating" around the room or "Checking" student work. In reading instruction at second and fifth grade, carrying on "Discussion" sessions were more common in the rural classrooms than the urban or suburban.

Teacher responses. Teacher responses to pupil events had generally similar levels of occurrence in all geographic locations (Tables 115 through 118). It is of interest, however, to examine the frequencies of "Positive

Table 111

Average Prorated Incidence of Activities Observed in Classrooms
Stratified by Location - Reading - Grade 2

	Urban N=22			Suburban N=13			Rural N=6		
Activities	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Academic Organizing	4.09	2.70	4.78	1.93	.85	2.53	1.65	.90	1.93
Answering	1.08	.06	3.84	.10	.05	.36	.32	.19	.78
Asking	5.91	4.20	5.80	4.49	4.05	5.26	12.75	5.20	17.53
At Desk	.60	.15	2.25	.23	.11	.58	0	0	0
At Board	2.31	.07	8.82	.20	.12	.49	1.87	.63	3.49
Checking	1.26	.07	3.26	4.25	1.93	5.23	4.08	1.25	7.81
Circulating	1.99	.09	5.87	12.39	1.30	27.00	.82	.49	2.00
Discussion	.66	.10	1.90	1.96	1.10	2.37	5.17	.60	11.52
Explaining	.45	.07	1.29	.52	.19	.80	.53	.30	.86
Helping	2.94	.45	5.61	4.58	1.20	8.45	4.17	.75	8.36
Instruction Giving	1.71	.25	2.51	2.06	1.35	2.99	4.97	2.85	6.76
Listening	1.40	.30	2.04	3.80	1.48	4.95	3.68	3.00	3.52
Question & Answer	1.70	.40	3.17	1.32	.11	2.66	.58	.25	1.02
Supervising	2.42	.12	6.23	.60	.31	.98	.08	.05	.20
Working With	52.14	55.20	24.28	36.52	40.75	29.06	48.00	49.00	30.15

Table 112

Average Prorated Incidence of Activities Observed in Classrooms Stratified by Location - Reading - Grade 5

	Urban N=25			Suburban N=14			Rural N=14		
Activities	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.	$\bar{X}$	Median	S.D.
Academic Organizing	1.14	.14	2.09	5.08	2.50	6.68	2.32	.36	5.82
Answering	4.40	.60	12.15	5.20	.64	13.41	0	0	0
Asking	5.97	5.65	5.09	4.91	.68	7.66	2.53	.42	4.35
At Desk	2.21	.14	7.17	13.11	.80	23.10	4.34	1.69	9.71
At Board	1.01	.12	2.27	1.21	.15	3.80	.37	.20	1.39
Checking	2.87	.73	4.15	9.13	2.25	16.57	4.11	1.16	8.00
Circulating	3.44	.24	6.06	8.30	4.30	9.51	12.85	1.16	26.53
Discussion	4.12	.39	7.89	.36	.15	.95	7.69	2.58	13.04
Explaining	2.16	.20	4.99	.13	.07	.48	1.38	.25	3.44
Helping	3.08	1.10	4.19	7.30	1.85	10.81	1.13	.20	2.09
Instruction Giving	4.11	3.03	4.54	3.26	.55	7.52	2.19	.68	3.42
Listening	.58	.13	1.46	4.21	1.85	6.25	1.21	.36	2.19
Question & Answer	6.60	.71	10.70	3.44	.37	8.80	.51	.26	1.30
Supervising	2.32	.31	4.41	1.61	.32	3.90	4.95	.30	11.57
Working With	38.06	34.95	26.42	24.16	19.15	20.81	28.06	26.25	25.31

Table 113

Average Prorated Incidence of Activities Observed in Classrooms Stratified by Location - Mathematics - Grade 2

Activities	Urban N=22 $\overline{X}$	Urban N=22 Median	Urban N=22 S.D.	Suburban N=13 $\overline{X}$	Suburban N=13 Median	Suburban N=13 S.D.	Rural N=6 $\overline{X}$	Rural N=6 Median	Rural N=6 S.D.
Academic Organizing	2.56	.33	4.42	.47	.20	.78	3.50	2.25	4.49
Answering	2.56	.26	8.23	.11	.06	.39	0	0	0
Asking	4.21	.88	6.39	5.88	3.40	7.60	8.62	2.95	13.86
At Desk	.65	.34	3.05	.32	.17	1.14	0	0	0
At Board	6.57	1.43	11.73	3.46	.59	7.69	1.60	3.92	.96
Checking	4.43	.64	12.25	10.62	9.40	9.78	6.45	2.85	11.19
Circulating	7.56	1.05	13.56	16.42	.81	27.26	20.63	2.25	38.22
Discussion	3.98	2.08	18.66	.32	.17	1.14	1.12	.67	2.74
Explaining	1.43	.19	4.58	2.71	.53	4.67	3.22	1.70	4.38
Helping	3.02	.39	8.25	7.47	2.08	11.80	7.82	4.45	9.33
Instruction Giving	2.44	.58	3.97	3.74	2.23	4.94	2.98	.60	5.23
Listening	.10	.04	.34	0	0	0	.73	.44	1.80
Question & Answer	1.37	.32	3.47	2.34	1.18	5.78	.20	.12	.49
Supervising	3.61	.60	5.63	2.19	.74	5.91	.38	.23	.94
Working With	31.76	22.10	29.13	27.35	24.45	21.78	25.00	30.45	21.54

Table 114

Average Prorated Incidence of Activities Observed in Classrooms
Stratified by Location - Mathematics - Grade 5

	Urban			Suburban			Rural		
	N=25			N=14			N=14		
Activities	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Academic Organizing	2.24	.71	3.49	1.45	.42	2.64	.81	.38	1.39
Answering	3.19	.11	9.87	4.81	1.06	10.18	.19	.10	.70
Asking	4.19	.32	6.13	2.64	.32	7.50	5.48	1.20	7.14
At Desk	5.86	.21	15.44	7.70	2.92	14.24	4.29	.56	14.22
At Board	1.52	.19	2.94	1.25	.16	2.80	2.18	.98	3.75
Checking	3.94	2.23	5.85	6.90	.86	10.58	12.50	3.60	18.43
Circulating	5.44	1.40	9.33	9.58	4.50	13.45	11.85	1.10	15.24
Discussion	.85	.23	2.30	.54	.29	2.00	.63	.26	1.36
Explaining	4.66	.83	8.61	2.29	.61	3.81	6.59	.53	18.01
Helping	5.99	.88	8.57	10.97	8.00	14.27	6.26	1.90	10.42
Instruction Giving	2.95	.79	3.94	4.99	.56	14.90	2.02	.49	3.35
Listening	.14	.07	.70	.31	.17	1.15	0	0	0
Question & Answer	2.83	.44	6.47	1.17	.63	4.38	.14	.07	.51
Supervising	2.07	.14	4.76	.62	.34	2.33	5.23	.96	13.06
Working With	30.60	27.35	22.95	13.97	12.75	15.61	17.65	7.00	21.70

Table 115

Average Prorated Incidence of Responses Observed in Classrooms
Stratified by Location - Reading - Grade 2

Responses	Urban N=22 $\overline{X}$	Urban N=22 Median	Urban N=22 S.D.	Suburban N=13 $\overline{X}$	Suburban N=13 Median	Suburban N=13 S.D.	Rural N=6 $\overline{X}$	Rural N=6 Median	Rural N=6 S.D.
Instructing	3.45	2.45	4.18	5.14	4.28	5.02	3.87	3.35	3.65
Disciplining	1.98	.21	3.97	2.02	.64	2.93	1.10	.25	1.56
Teacher Help	2.33	1.95	2.25	2.30	2.53	2.01	2.30	3.05	1.85
Ignoring	2.32	.42	3.84	2.01	1.13	2.88	1.08	.38	2.01
Moves On	1.10	.21	1.79	.61	.19	1.05	3.27	1.80	3.80
Negative Feedback	.67	.15	1.69	.34	.12	.90	0	0	0
None	65.94	66.25	14.28	56.99	57.10	21.84	59.23	58.50	16.27
Positive Feedback	7.67	6.50	7.19	5.55	5.00	3.98	8.03	7.75	4.21
Praise	3.00	1.15	4.19	3.74	1.93	3.91	2.43	3.05	2.00
Questioning	2.12	1.45	2.55	2.23	2.20	2.18	4.20	2.15	6.83
Recognizing	1.34	.35	2.00	1.52	1.20	1.65	3.13	2.93	2.38
Redirecting	3.13	3.35	3.35	2.99	2.35	2.86	5.75	4.25	3.41

Table 116

Average Prorated Incidence of Responses Observed in Classrooms
Stratified by Location - Reading - Grade 5

	Urban N=25			Suburban N=14			Rural N=14		
Responses	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Instructing	2.34	2.20	2.15	5.80	2.95	8.07	1.81	.36	3.10
Disciplining	.53	.06	1.20	1.24	.45	1.55	.96	.25	2.51
Teacher Help	1.99	1.54	2.54	1.96	1.70	2.27	1.22	.20	2.71
Ignoring	1.72	.40	2.11	2.27	.36	4.78	1.35	.28	2.27
Moves On	1.35	.13	1.99	.67	.30	1.42	.59	.16	1.16
Negative Feedback	.10	.03	.32	.37	.06	.87	.65	.35	2.43
None	70.88	70.63	15.24	57.50	61.85	19.09	66.27	68.40	22.95
Positive Feedback	5.91	5.60	5.22	5.59	2.00	8.73	6.60	5.15	8.37
Praise	2.94	2.15	3.73	2.51	.68	3.72	.33	.11	.92
Questioning	.96	.13	1.52	1.44	.49	2.64	.79	.11	1.96
Recognizing	3.27	2.61	4.63	2.08	1.58	2.21	2.70	.90	3.88
Redirecting	2.27	2.15	2.22	3.61	2.75	4.25	4.00	1.80	5.27

Table 117

Average Prorated Incidence of Responses Observed in Classrooms
Stratified by Location - Mathematics - Grade 2

	Urban N=25			Suburban N=14			Pural N=14		
Responses	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Instructing	3.19	1.50	5.47	5.25	5.67	3.81	3.30	1.75	4.49
Disciplining	1.72	.49	2.88	1.04	.43	1.57	1.12	.67	2.74
Teacher Help	3.00	1.55	4.02	3.52	3.60	3.15	4.22	2.90	4.01
Ignoring	2.10	.23	3.55	3.55	2.33	3.95	1.18	.28	2.40
Moves On	.31	.10	.84	.47	.22	.84	.18	.11	.45
Negative Feedback	.37	.10	1.06	.16	.09	.58	.20	.12	.49
None	64.15	66.40	19.62	63.32	64.48	12.94	72.93	70.75	9.46
Positive Feedback	4.95	1.90	6.95	9.00	5.03	2.59	4.75	4.65	4.74
Praise	2.67	.70	4.02	2.54	.56	4.33	.77	.55	.94
Questioning	2.32	.33	7.50	.52	.21	1.07	1.70	.55	2.70
Recognizing	2.75	.23	4.74	1.83	.43	2.45	2.45	2.90	2.05
Redirecting	3.52	2.95	4.29	2.96	3.03	3.01	3.48	1.65	4.39

Table 118

Average Prorated Incidence of Responses Observed in Classrooms
Stratified by Location - Mathematics - Grade 5

	Urban N=22			Suburban N=14			Rural N=14		
Responses	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.	$\overline{X}$	Median	S.D.
Instructing	2.62	1.65	3.28	2.32	1.20	3.17	5.33	5.05	5.12
Disciplining	.84	.14	1.61	1.00	.18	2.66	1.82	.65	2.37
Teacher Help	1.33	.20	2.69	3.59	1.85	3.95	3.65	2.10	4.14
Ignoring	2.38	1.33	3.45	2.64	.95	4.18	3.65	1.30	5.39
Moves On	.42	.11	.96	.31	.17	1.15	.64	.14	1.52
Negative Feedback	.34	.06	1.06	.54	.30	1.08	.36	.16	.96
None	70.35	73.93	19.98	61.10	69.80	28.22	70.34	73.60	14.49
Positive Feedback	4.75	3.30	4.92	3.24	.30	5.43	2.31	1.70	3.49
Praise	1.50	.37	2.61	1.40	.56	2.45	.52	.26	1.06
Questioning	.56	.13	1.50	.41	.22	.82	.69	.38	1.17
Recognizing	2.30	1.18	3.17	4.19	1.85	8.63	2.82	2.10	3.12
Redirecting	1.97	.88	2.47	1.49	.40	2.38	2.22	1.95	2.51

Feedback" and "Negative Feedback" as well as instances of "Disciplining" and "Praise" in order to locate differences in teacher responses which might be associated with the locale of the classrooms. In reading instruction, "Positive Feedback" was more frequent in the rural setting. When "Praise" and "Positive Feedback" were combined, the total frequencies occurring in reading instruction were at similar levels in all locations. In mathematics, the combined rates of "Positive Feedback" and "Praise" were lowest for the rural classes, and highest for suburban at second grade and for urban at fifth grade. In all settings "Negative Feedback" was uncommon and occurred with similar frequency in both instructional areas, at both grade levels and in all locations. Evidence of "Disciplining" was highest in second grade suburban classes in reading and lowest in these same classes in mathematics. When the rates of disciplining were combined over all instructional areas and grade levels, there seemed to be no difference on the whole in the instances of pupil behavior requiring disciplinary action which could be associated with the urbanization of the schools.

Comparisons of Time Allocation in Instructional Contexts for Schools Differing with Respect to Socioeconomic Status Level

The distribution of number of minutes in each context, the number of productive minutes and the percent of overall time and productive time in contexts, stratified by SES level for second grade reading, are presented in Tables 119 through 124. Each table provides the mean, median and range for each of the contexts. When data are presented for the percent of productive time in context and the percent of gross productive time, only those classrooms in which pupils worked in that context were included in the calculations. For these tables, we indicated the actual number of classrooms in which pupils were observed in each context (such as Tables 122 and 124). The data presented in the remainder of the tables include all of the classrooms in the computation of the means and medians and the percent of time in contexts. (Refer to pp. 59 - 64 in the body of this report for a complete description of these time allocation variables.)

As the reader scans these tables for findings of interest, there will be several ways in which the review can be approached. One can examine the contexts in which most time was spent across grade levels or across instruction within a grade level. Then by comparing the extent of productivity in context one has a basis for hypothesizing the relationship between context and productivity by grade and instructional area. Another way of reviewing the tables might be to examine differences within a particular context. For example, in what areas and at what grade are the individual contexts most common? What proportion of classrooms utilize different types of individual instruction? How productive are pupils in these contexts? In the discussion of these results, we will make some generalizations about possible important differences in instruction which reflect the ways in which teachers organize learning experiences in schools with populations from different socioeconomic status levels. In a later section we will examine differences with respect to location of the school.

At the second grade across all SES levels, more pupil time was spent in Independent-Group reading instruction than in other contexts. Second in order of amount of time spent was the Teacher-Group context. We have pointed out earlier that there seemed to be evidence that the middle SES classrooms were the ones which employed the Independent-Individual contexts to the greatest extent. The time allocation data support this conclusion

Table 119

Mean Number of Minutes Per Student Per
Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=14			Middle N=16			High Middle-High N=9		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	14.00	1.88	0-65.00	.06	.03	0- 1.00	8.33	8.25	0-17.00
I-Class	3.64	1.09	0-25.00	3.94	.67	0- 23.00	3.44	.25	0-23.00
T-Group	16.57	15.00	0-55.00	15.88	13.50	2- 53.00	21.22	20.25	0-42.00
I-Group	17.14	10.00	0-77.00	23.31	19.50	0- 56.00	31.44	30.00	8-57.00
T-Individual	.21	.12	0- 3.00	.38	.14	0- 4.00	.11	.06	0- 1.00
I-Individual	7.79	.56	0-55.00	10.06	2.10	0-107.00	.89	.29	0- 6.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	4.14	1.11	0-29.00	5.44	.39	0- 24.00	4.11	2.75	0-14.00
A-Individual	.21	.08	0- 2.00	.63	.17	0- 4.00	.22	.13	0- 2.00
Test	.86	.42	0- 7.00	.00	.00		.00	.00	

Table 120

Mean Number Productive Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=14			Middle N=16			High Middle-High N=9		
	X̄	Median	Range	X̄	Median	Range	X̄	Median	Range
T-Class	11.79	3.61	0-64.00	.06	.03	0-1.00	7.44	7.50	0-15.00
I-Class	3.21	.55	0-23.00	2.25	.46	0-18.00	2.89	.86	0-20.00
T-Group	11.71	11.75	0-30.00	12.06	10.50	1-29.00	17.78	19.00	5-29.00
I-Group	12.50	7.67	0-51.00	15.63	13.50	0-49.00	23.33	22.00	4-49.00
T-Individual	.[illegible]1	.12	0- 3.00	.25	.14	0- 2.00	.11	.06	0- 1.00
I-Individual	6.07	.28	0-40.00	7.25	1.50	0-74.00	.22	.13	0- 2.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	3.43	1.11	0-25.00	4.25	.39	0-20.00	3.22	2.00	0-11.00
A-Individual	.21	.08	0- 2.00	.44	.17	0- 2.00	.22	.13	0- 2.00
Test	.50	.08	0- 6.00	.00	.00		.00	.00	

Table 121

Mean Percent Total Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=14			Middle N=16			High Middle-High N=9		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	24.14	3.75	0-100.00	.13	.07	0- 2.00	12.33	15.75	0-20.00
I-Class	4.64	1.09	0- 43.00	6.38	1.17	0-38.00	3.33	.50	0-22.00
T-Group	26.71	23.00	0-100.00	31.06	26.50	6-85.00	32.00	29.75	16-55.00
I-Group	23.21	15.50	0- 62.00	39.13	38.50	0-74.00	41.78	44.00	24-60.00
T-Individual	.36	.19	0- 5.00	.56	.12	0- 7.00	.22	.13	0- 2.00
I-Individual	10.36	.38	0- 83.00	9.81	2.70	0-63.00	2.44	.86	0-16.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	7.64	1.67	0- 46.00	9.38	1.50	0-47.00	7.56	2.00	0-31.00
A-Individual	.36	.17	0- 3.00	1.31	.33	0- 7.00	.67	.38	0- 6.00
Test	1.21	.50	0- 11.00	.00	.00		.11	.06	0- 1.00

Table 122

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low				Middle				High Middle-High			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	76.00	80.00	44- 97.00	5	8.00	8.00		1	43.29	45.25	16-79.00	7
I-Class	57.00	56.50	21- 95.00	3	41.25	38.50	1-87.00	4	38.33	33.25	10-87.00	3
T-Group	52.09	49.00	12-100.00	11	50.56	51.00	4-95.00	16	71.89	77.00	42-95.00	9
I-Group	44.09	40.00	17- 81.00	11	55.33	57.75	2-89.00	15	61.56	64.00	35-83.00	9
T-Individual	25.00	25.00		1	16.33	16.25	8-25.00	3	10.00	10.00		1
I-Individual	37.20	31.25	5- 77.00	5	30.67	30.00	11-53.00	6	8.00	8.00		1
A-Class				0				0				0
A-Group	32.60	21.00	12- 85.00	5	33.29	35.75	7-61.00	7	35.67	35.00	28-46.00	3
A-Individual	16.50	16.50	8- 25.00	2	15.50	15.50	8-23.00	4	12.00	12.00	4-20.00	2
Test	13.00	13.00	2- 24.00	2				0	4.00	4.00		1

Table 123

Mean Percent Gross Time Per
Student Per Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=14			Middle N=16			High Middle-High N=9		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	23.07	3.75	0-100.00	.06	.03	0- 1.00	10.78	13.63	0-20.00
I-Class	5.07	1.77	0- 44.00	7.81	1.00	0-44.00	2.89	.25	0-19.00
T-Group	26.14	23.50	0-100.00	27.94	25.00	6-80.00	30.67	29.00	18-50.00
I-Group	25.14	17.75	0- 68.00	40.75	41.00	0-74.00	43.89	45.50	25-58.00
T-Individual	.43	.23	0- 6.00	.63	.12	0- 7.00	.22	.13	0- 2.00
I-Individual	10.43	.38	0- 81.00	11.75	2.70	0-89.00	2.22	.43	0-17.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	7.71	1.94	0- 46.00	9.63	.50	0-49.00	8.44	2.50	0-39.00
A-Individual	.43	.25	0- 3.00	1.56	.67	0- 7.00	.67	.38	0- 6.00
Test	1.79	.67	0- 17.00	.00	.00		.00	.00	

Table 124

Mean Percent Gross Productive Time Per Student
Per Day Spent in Contexts During Reading -
Classrooms Stratified by SES -
GRADE 2

	Low Middle-Low				Middle				High Middle-High			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	85.40	85.75	72- 98.00	5	100.00	100.00		1	88.71	92.25	73- 96.00	7
I-Class	82.33	85.50	52-100.00	3	62.50	74.00	3- 99.00	4	79.67	81.00	67- 87.00	3
T-Group	79.46	82.50	28-100.00	11	78.31	89.50	9-100.00	16	87.00	89.13	70-100.00	9
I-Group	79.73	79.25	54-100.00	11	66.33	75.63	12- 94.00	15	72.22	72.25	54- 86.00	9
T-Individual	100.00	100.00		1	83.33	87.50	50-100.00	3	100.00	100.00		1
I-Individual	75.80	78.75	50- 94.00	5	75.50	79.00	57- 85.00	6	100.00	100.00		1
A-Class				0				0				0
A-Group	81.60	80.25	70- 98.00	5	76.00	81.75	41- 92.00	7	79.67	79.00	65- 97.00	3
A-Individual	100.00	100.00		2	82.50	87.50	55-100.00	4	100.00	100.00		2
Test	49.50	49.50	12- 87.00	2				0	33.00	33.00		1

since the context which averages third highest in time for the middle SES schools was Independent-Individual. In the high and low SES classrooms, Teacher-Class contexts ranked third.

At least 50 percent of the reading instruction time of second graders was spent in Teacher-Group and Independent-Group contexts. The differences between the SES levels of the schools were most prominent in the extent of Teacher-Class instruction. In the low SES schools, 24 percent of the time was in this context, while it occurred only six percent of the time in middle SES schools. At the low SES levels, there was a greater extent of reading instruction by class (T-Class and I-Class) than at the other two socioeconomic status levels. In the high SES schools, the proportion of individual instruction was less than for middle and low SES classrooms.

The extent of fifth grade reading instruction by class (T-Class and I-Class) in the low SES classrooms was generally the same as at second grade. However, there were large differences between grade levels in the extent to which instruction was by the teacher to the class as a unit in the high SES schools (Tables 125 - 130). Table 127 shows that 63 percent of reading instruction time in high SES classrooms was in T-Class and I-Class contexts while only 34 percent of time in middle SES classrooms and 27 percent of time in low SES classrooms was in these contexts. The proportion of time in instruction by group (T-Group and I-Group) remained the same in the fifth grade low SES classes and middle SES classes as it was in second grade, but it decreased to 30 percent (compared with 74 percent at second grade) in the high SES classes. Teacher-Class instruction was judged to be the most productive of all contexts in fifth grade reading for the high SES classes and the low SES classes although the percent in the latter case was considerably lower. Teacher-Group instruc-

Table 125

Mean Number of Minutes Per Student
Per Day Spent in Contexts During Reading - Classrooms Stratified by SES -
GRADE 5

	Low Middle-Low N= 21			Middle N=17			High Middle-High N=11		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	4.19	1.13	0-18.00	4.53	.82	0-35.00	18.46	4.25	0-80.00
I-Class	8.62	1.88	0-65.00	11.41	3.50	0-50.00	19.73	16.00	0-51.00
T-Group	11.81	8.50	0-40.00	9.94	9.00	0-26.00	8.82	2.92	0-29.00
I-Group	20.67	15.75	0-60.00	23.59	19.75	0-60.00	11.64	4.29	0-50.00
T-Individual	.10	.05	0- 2.00	.06	.03	0- 1.00	.00	.00	
I-Individual	5.19	.78	0-39.00	1.12	.27	0-15.00	3.36	.38	0-30.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	2.86	.75	0-31.00	.00	.00		.00	.00	
A-Individual	.00	.00		.06	.03	0- 1.00	.00	.00	
Test	.86	.45	0-18.00	.00	.00		.00	.00	

Table 126

Mean Number Productive Minutes Per Student
Per Day Spent in Contexts During Reading -
Classrooms Stratified by SES -
GRADE 5

	Low Middle-Low N= 21			Middle N= 17			High Middle-High N= 11		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	3.52	1.13	0-14.00	4.00	.63	0-34.00	15.37	3.75	0-76.00
I-Class	6.24	.38	0-53.00	7.18	2.00	0-30.00	14.73	11.25	0-40.00
T-Group	9.57	6.25	0-34.00	9.06	8.63	0-23.00	6.18	2.50	0-29.00
I-Group	15.00	11.25	0-46.00	18.82	15.00	0-48.00	7.27	2.57	0-32.00
T-Individual	.10	.05	0- 2.00	.00	.00		.00	.00	
I-Individual	4.14	.78	0-27.00	.24	.13	0- 2.00	2.27	.19	0-19.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	2.33	.50	0-26.00	.00	.00		.00	.00	
A-Individual	.00	.00		.06	.03	0- 1.00	.00	.00	
Test	.71	.38	0-15.00	.00	.00		.00	.00	

Table 127

Mean Percent Total Minutes Per Student Per Day Spent in Contexts During Reading-Classrooms Stratified by SES-
GRADE 5

	Low Middle-Low N= 21			Middle N=17			High Middle-High N=11		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	8.81	2.25	0- 46.00	6.35	2.73	0- 42.00	22.00	9.75	0-80.00
I-Class	18.48	4.13	0-100.00	28.06	4.38	0-100.00	40.55	41.50	0-95.00
T-Group	19.71	18.00	0- 67.00	18.00	19.88	0- 44.00	14.09	7.08	0-53.00
I-Group	35.86	30.50	0- 89.00	44.82	42.50	0- 95.00	15.46	7.43	0-67.00
T-Individual	.33	.18	0- 7.00	.12	.06	0- 2.00	.00	.00	
I-Individual	9.38	1.56	0- 63.00	2.47	.60	0- 33.00	5.73	1.13	0-50.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	4.52	2.42	0- 33.00	.00	.00		.00	.00	
A-Individual	.00	.00		.18	.09	0- 3.00	.00	.00	
Test	2.38	1.25	0- 50.00	.00	.00		.00	.00	

Table 128

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 5

	Low Middle-Low				Middle				High Middle-High			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	56.78	54.75	9-100.00	9	56.60	52.50	30- 97.00	5	77.50	78.00	60-95.00	6
I-Class	49.00	42.00	5- 86.00	9	43.40	34.00	14-100.00	10	62.67	70.75	15-97.00	9
T-Group	43.81	47.50	9- 98.00	16	67.50	75.00	15- 96.00	12	56.00	54.25	36-82.00	5
I-Group	56.40	63.00	17- 88.00	15	69.64	73.25	14- 96.00	14	57.75	57.00	45-72.00	4
T-Individual	25.00	25.00		1	3.00	3.00		1				0
I-Individual	49.20	51.50	16- 82.00	5	11.00	11.00		1	23.00	24.75	7-32.00	3
A-Class				0				0				0
A-Group	40.00	40.50	28- 50.00	3				0				0
A-Individual				0	8.00	8.00		1				0
Test	44.00	44.00		1				0				0

Table 129

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by SES-
GRADE 5

	Low Middle-Low N=21			Middle N=17			High Middle-High N=11		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	8.14	2.63	0- 44.00	6.88	3.00	0- 41.00	22.55	10.25	0-80.00
I-Class	17.19	4.88	0-100.00	28.65	5.50	0-100.00	39.55	35.50	0-94.00
T-Group	20.48	20.75	0- 67.00	17.41	21.00	0- 38.00	14.27	7.50	0-59.00
I-Group	38.29	37.75	0- 86.00	44.35	43.75	0- 95.00	16.46	8.57	0-67.00
T-Individual	.33	.18	0- 7.00	.06	.03	0- 1.00	.00	.00	
I-Individual	8.86	2.66	0- 62.00	2.47	.60	0- 33.00	7.18	.94	0-67.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	4.71	2.50	0- 36.00	.00	.00		.00	.00	
A-Individual	.00	.00		.12	.06	0- 2.00	.00	.00	
Test	2.10	1.10	0- 44.00	.00	.00		.00	.00	

Table 130

Mean Percent Gross Productive Time Per Student Per Day Spent in Contexts During Reading-Classrooms Stratified by SES-GRADE 5

	Low Middle-Low				Middle				High Middle-High			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	85.00	88.50	63-100.00	9	93.80	93.13	90-100.00	5	82.33	84.50	65-95.00	6
I-Class	66.56	71.25	10- 91.00	9	70.40	83.50	29-100.00	10	71.33	76.75	42-97.00	9
T-Group	85.69	88.00	50-100.00	16	91.33	91.83	73-100.00	12	68.80	71.00	35-98.00	5
I-Group	74.73	74.75	50- 95.00	15	78.71	81.50	59- 94.00	14	64.75	62.00	54-81.00	4
T-Individual	100.00	100.00		1	50.00	50.00		1				0
I-Individual	84.80	87.00	67- 97.00	5	100.00	100.00		1	73.33	71.00	63-93.00	3
A-Class				0				0				0
A-Group	79.67	80.50	71- 85.00	3				0				0
A-Individual				0	71.00	71.00		1				0
Test	86.00	86.00		1				0				0

tion in reading in the middle SES schools was a relatively frequent occurrence and judged to be a highly productive setting for pupils.

This examination of time allocation in contexts in reading shows that the distribution of time was fairly consistent between grades in the low SES schools, but changed markedly between second and fifth grade in the high SES classrooms. The data also show that individualized instruction occurred most frequently at the middle SES schools, ranking third after group instruction in time allocation.

The tables next in order are those reporting the time allocation data for second grade (Tables 131 through 136) and fifth grade (Tables 137 through 142) mathematics. Second grade pupils in the high SES schools were involved in instruction by the teacher to the entire class 75 percent of the time, while group instruction occupied 21 percent of the total number of minutes reported for mathematics in these classes. Four contexts dominated mathematics instruction at both grade levels, but there were differences among SES level of school in the extent of group instruction. In the middle SES schools the time spent in instruction by class and by group in mathematics was similar. In the low and high SES schools considerably more time was spent in instruction by class. Independent-Individual contexts were a relatively rare form of mathematics instruction at second grade involving only a few low and middle SES classrooms, and only two classrooms at fifth grade, (both low SES).

The data characterize mathematics instruction at fifth grade as being carried out in contexts where the class works independently of the teacher either as a total unit on the same assignment or in groups with assignments according to learning level. For example, even though much time was devoted to the Teacher-Class context in the low SES classes, the combined time spent in the Independent-Class and Independent-Group contexts in the low SES classrooms was greater than the combined contexts with teachers directly in charge of the instruction.

When one examines the second grade mathematics tables for evidence of the contexts in which there were greater levels or productivity as judged by the observers, both class and group instruction had high levels of productivity in the high and middle SES classes. The productivity level was lower in the low SES classes with the exception of the Teacher-Class context. It is of interest that of all SES levels, Teacher-Group instruction was observed to be least productive for the low SES pupils. In the low SES classes the relatively low level of observed productive work and the indication of a reliance on instruction by class or independently of the teacher raises the question of the degree of teacher dependence on curriculum materials or textbooks and their effectiveness for guiding the learning experiences of children in mathematics.

Mathematics instruction of the class as a unit (Independent-Class) was most common in the fifth grade high and middle SES schools. Teacher-Class instruction was still prevalent in mathematics lessons for the low SES classes, but an almost identical proportion of time was spent in the Independent-Class context. When the time allocation units associated with instruction by class were examined, the proportions for class instruction were similar for second and fifth grade low and high SES classrooms, but Tables 133 and 139 show that the percentage of Teacher-Class time at fifth grade was considerably less than at second grade even though the amount of time spent in instruction by class (Teacher-Class time and Independent-Class time) was similar at both grade levels. This means that as pupils

Table 131

Mean Number of Minutes Per Student Per Day Spent in Contexts During Mathematics-Classrooms Stratified by SES-GRADE 2

	Low Middle-Low N=13			Middle N=15			High Middle-High N=9		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	16.85	10.50	0-50.00	9.60	7.50	0-33.00	21.56	22.13	0-46.00
I-Class	3.39	1.33	0-15.00	7.80	4.75	0-27.00	7.11	2.50	0-28.00
T-Group	4.69	1.00	0-29.00	7.67	2.38	0-33.00	2.11	.75	0-10.00
I-Group	6.46	3.75	0-22.00	10.67	7.25	0-34.00	4.56	.40	0-20.00
T-Individual	.00	.00		.00	.00		.00	.00	
I-Individual	1.69	.22	0-15.00	3.33	.88	0-30.00	.00	.00	
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	1.77	.67	0-10.00	.80	.36	0- 4.00	.00	.00	
A-Individual	.31	.09	0- 3.00	.20	.08	0- 2.00	.00	.00	
Test	.00	.00		.00	.00		1.00	.56	0- 9.00

Table 132

Mean Number Productive Minutes Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by SES -
GRADE 2

	Low Middle-Low N=13			Middle N=15			High Middle-High N=9		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	12.39	9.00	0-34.00	7.53	6.50	0-28.00	18.33	18.50	0-41.00
I-Class	2.08	.67	0-14.00	6.07	3.06	0-24.00	4.22	1.75	0-15.00
T-Group	2.77	1.00	0-15.00	7.00	2.00	0-29.00	1.89	.50	0- 9.00
I-Group	4.54	2.50	0-13.00	8.13	4.25	0-27.00	3.11	.40	0-10.00
T-Individual	.00	.00		.00	.00		.00	.00	
I-Individual	1.39	.22	0-12.00	2.67	.75	0-24.00	.00	.00	
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	1.39	.45	0-10.00	.47	.25	0- 3.00	.00	.00	
A-Individual	.08	.04	0- 1.00	.13	.08	0- 1.00	.00	.00	
Test	.00	.00		.00	.00		1.00	.56	0- 9.00

Table 133

Mean Percent Total Minutes Per Student Per Day Spent in Contexts During Mathematics-Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=13			Middle N=15			High Middle-High N=9		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	47.85	40.00	0-100.00	25.87	13.25	0- 80.00	58.44	60.50	0-100.00
I-Class	7.23	2.89	0- 36.00	17.80	7.75	0- 67.00	17.00	6.25	0- 68.00
T-Group	11.69	4.25	0- 55.00	20.20	8.63	0-100.00	6.22	1.75	0- 33.00
I-Group	21.23	11.25	0- 74.00	25.13	15.00	0- 71.00	15.11	2.00	0- 67.00
T-Individual	.00	.00		.67	.36	0- 10.00	.11	.06	0- 1.00
I-Individual	5.54	.67	0- 48.00	5.13	2.63	0- 34.00	.00	.00	
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	5.39	1.78	0- 34.00	2.07	.73	0- 10.00	.00	.00	
A-Individual	.85	.30	0- 5.00	.40	.08	0- 5.00	.00	.00	
Test	.00	.00		.00	.00		3.33	1.88	0- 30.00

Table 134

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by SES -
GRADE 2

	Low Middle-Low N=13				Middle N=15				High Middle-High N=9			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	61.10	61.50	26-88.00	10	61.11	67.00	15-88.00	9	77.38	77.50	60-90.00	8
I-Class	29.25	31.50	6-48.00	4	66.00	71.00	26-95.00	7	44.00	38.00	28-73.00	5
T-Group	23.14	17.50	7-56.00	7	55.89	70.00	3-88.00	9	44.00	39.00	23-85.00	3
I-Group	36.63	32.00	10-68.00	8	49.50	51.50	10-87.00	10	45.25	45.00	7-84.00	4
T-Individual				0				0	17.00	17.00		1
I-Individual	18.75	15.50	4-40.00	4	23.67	22.75	18-33.00	3				0
A-Class				0				0				0
A-Group	27.33	24.75	15-50.00	3	16.33	14.25	8-33.00	3				0
A-Individual	9.00	9.00	8-10.00	2	10.50	10.50	10-11.00	2				0
Test				0				0	42.00	42.00		1

Table 135

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=13			Middle N=15			High Middle-High N=9		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	46.92	36.50	0-100.00	25.20	13.25	0- 77.00	57.89	63.50	0-100.00
I-Class	8.39	3.33	0- 41.00	19.33	12.75	0- 68.00	16.78	4.50	0- 69.00
T-Group	12.77	3.50	0- 57.00	18.00	3.63	0-100.00	7.11	1.25	0- 33.00
I-Group	20.31	10.00	0- 74.00	26.07	18.00	0- 73.00	15.44	1.20	0- 67.00
T-Individual	.00	.00		.07	.04	0- 1.00	.11	.06	0- 1.00
I-Individual	5.15	.67	0- 41.00	8.13	4.38	0- 49.00	.00	.00	
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	5.85	2.44	0- 33.00	2.67	.73	0- 15.00	.00	.00	
A-Individual	.92	.15	0- 7.00	.47	.23	0- 4.00	.00	.00	
Test	.00	.00		.00	.00		2.78	1.56	0- 25.00

Table 136

Mean Percent Gross Productive Time Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by SES-
GRADE 2

	Low Middle-Low N=13				Middle N=15				High Middle-High N=9			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	75.40	75.00	55- 99.00	10	78.44	80.88	57- 96.00	9	85.00	88.25	64- 95.00	8
I-Class	63.00	61.00	33- 97.00	4	82.14	82.88	68- 95.00	7	68.40	62.00	54-100.00	5
T-Group	73.14	76.50	36-100.00	7	89.00	96.00	53-100.00	9	93.00	94.00	85- 97.00	3
I-Group	73.00	80.50	30-100.00	8	75.60	78.00	58-100.00	10	75.00	75.00	48- 86.00	4
T-Individual				0				0	100.00	100.00		1
I-Individual	82.50	81.50	67-100.00	4	80.33	80.00	77- 85.00	3				0
A-Class				0				0				0
A-Group	91.67	93.75	75-100.00	3	93.33	95.00	80-100.00	3				0
A-Individual	78.50	78.50	57-100.00	2	92.00	92.00	84-100.00	2				0
Test				0				0	100.00	100.00		1

Table 137

Mean Number of Minutes Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by SES-
GRADE 5

	High Middle-High N=11			Middle N=14			Low Middle-Low N=19		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	15.64	12.00	0-42.00	9.14	3.00	0-40.00	14.58	11.75	0-50.00
I-Class	16.09	13.75	0-58.00	16.00	16.50	0-47.00	13.74	11.75	0-45.00
T-Group	5.82	.57	0-25.00	6.43	.50	0-22.00	5.63	.90	0-27.00
I-Group	8.64	2.63	0-37.00	11.93	12.00	0-28.00	11.05	6.50	0-52.00
T-Individual	.09	.05	0- 1.00	.00	.00		.00	.00	
I-Individual	.73	.40	0- 8.00	.00	.00		1.21	.19	0-17.00
A-Class	.00	.00		.00	.00		3.21	1.24	0-40.00
A-Group	.00	.00		.07	.04	0- 1.00	.05	.03	0- 1.00
A-Individual	.00	.00		.07	.04	0- 1.00	.05	.03	0- 1.00
Test	1.55	.56	0- 8.00	.43	.23	0- 6.00	.63	.09	0- 8.00

Table 138

Mean Number Productive Minutes Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by SES -
GRADE 5

	High Middle-High N=11			Middle N=14			Low Middle-Low N=19		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	12.64	10.38	0-33.00	7.50	2.63	0-33.00	10.79	8.13	0-33.00
I-Class	12.46	10.75	0-40.00	10.57	9.50	0-26.00	8.90	9.75	0-30.00
T-Group	4.00	.57	0-15.00	4.86	2.50	0-18.00	4.74	.45	0-21.00
I-Group	6.00	1.75	0-23.00	8.57	9.00	0-21.00	9.11	5.25	0-45.00
T-Individual	.00	.00		.00	.00		.00	.00	
I-Individual	.27	.15	0- 3.00	.00	.00		.68	.36	0-13.00
A-Class	.00	.00		.00	.00		2.37	.82	0-31.00
A-Group	.00	.00		.07	.04	0- 1.00	.05	.03	0- 1.00
A-Individual	.00	.00		.07	.04	0- 1.00	.05	.03	0- 1.00
Test	1.27	.56	0- 6.00	.43	.23	0- 6.00	.58	.09	0- 8.00

Table 139

Mean Percent Total Minutes Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by SES-
GRADE 5

	Low Middle-Low N=19			Middle N=14			High Middle-High N=11		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	28.58	24.00	0-100.00	19.86	10.50	0- 80.00	32.64	34.00	0-81.00
I-Class	28.63	27.50	0- 82.00	36.21	32.50	0-100.00	31.64	31.00	0-96.00
T-Group	11.11	2.25	0- 59.00	14.07	1.00	0- 51.00	11.64	.86	0-55.00
I-Group	20.58	13.75	0- 74.00	27.29	26.00	0- 82.00	15.91	4.75	0-65.00
T-Individual	.05	.03	0- 1.00	.00	.00		.00	.00	
I-Individual	3.37	.38	0- 50.00	.00	.00		2.73	1.50	0-30.00
A-Class	5.90	2.29	0- 73.00	.00	.00		.00	.00	
A-Group	.05	.03	0- 1.00	.14	.08	0- 2.00	.00	.00	
A-Individual	.05	.03	0- 1.00	.29	.15	0- 4.00	.00	.00	
Test	1.37	.19	0- 20.00	.79	.42	0- 11.00	5.46	.94	0-40.00

Table 140

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by SES -
GRADE 5

	Low Middle-Low N=19				Middle N=14				High Middle-High N=11			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	63.36	62.00	13-100.00	14	72.67	87.00	32-97.00	6	69.25	79.50	20-98.00	8
I-Class	53.55	55.25	20- 97.00	11	54.50	53.00	10-87.00	10	72.86	79.75	43-95.00	7
T-Group	35.67	31.50	16- 67.00	9	51.50	53.50	3-93.00	6	63.75	63.75	39-92.00	4
I-Group	43.33	43.00	8- 87.00	12	52.67	49.00	28-81.00	9	45.67	44.50	18-86.00	6
T-Individual	6.00	6.00		1				0	1.00	1.00		1
I-Individual	20.00	20.00	1- 39.00	2				0	13.00	13.00		1
A-Class	62.50	62.50	47- 78.00	2				0				0
A-Group	4.00	4.00		1	22.00	22.00		1				0
A-Individual	4.00	4.00		1	8.00	8.00		1				0
Test	30.33	28.00	20- 50.00	3	11.00	11.00		1	37.00	35.50	30-50.00	3

Table 141

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by SES-
GRADE 5

	Low Middle-Low N=19			Middle N=14			High Middle-High N=11		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	29.16	25.25	0-100.00	19.36	9.50	0- 80.00	33.73	37.50	0-81.00
I-Class	28.84	24.00	0- 82.00	38.07	35.00	0-100.00	31.82	31.25	0-95.00
T-Group	11.32	2.25	0- 65.00	15.00	1.00	0- 51.00	11.00	.86	0-51.00
I-Group	20.84	13.00	0- 74.00	26.43	26.50	0- 73.00	17.00	6.00	0-65.00
T-Individual	.05	.03	0- 1.00	.00	.00		.09	.05	0- 1.00
I-Individual	2.63	.38	0- 36.00	.00	.00		2.36	1.30	0-26.00
A-Class	5.53	1.88	0- 73.00	.00	.00		.00	.00	
A-Group	.05	.03	0- 1.00	.14	.08	0- 2.00	.00	.00	
A-Individual	.11	.06	0- 2.00	.14	.08	0- 2.00	.00	.00	
Test	1.47	.19	0- 20.00	.93	.50	0- 13.00	4.09	.94	0-26.00

Table 142

Mean Percent Gross Productive Time Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by SES -
GRADE 5

	Low Middle-Low N=19				Middle N=14				High Middle-High N=11			
	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N	$\overline{X}$	Median	Range	Actual N
T-Class	75.29	75.50	52-100.00	14	85.33	86.00	72- 97.00	6	82.88	82.50	67- 98.00	8
I-Class	70.18	72.50	39- 96.00	11	72.80	84.00	30-100.00	10	80.43	85.50	54- 95.00	7
T-Group	82.56	82.25	58-100.00	9	79.33	83.25	50- 93.00	6	77.50	76.00	58-100.00	4
I-Group	78.25	84.50	36-100.00	12	74.33	77.25	48- 92.00	9	75.17	71.00	57-100.00	6
T-Individual	100.00	100.00		1				0	20.00	20.00		1
I-Indvidual	46.00	46.00	14- 78.00	2				0	38.00	38.00		1
A-Class	73.00	73.00	68- 78.00	2				0				0
A-Group	80.00	80.00		1	67.00	67.00		1				0
A-Individual	70.00	70.00		1	75.00	75.00		1				0
Test	94.33	95.75	83-100.00	3	100.00	100.00		1	84.33	82.50	76-100.00	3

get older a greater proportion of their time in mathematics will be guided by textbook or workbook learning experiences and less time will be spent in teacher-directed activities.

In comparison to the other SES levels, the middle SES classrooms had the greatest proportion of Teacher-Group and Independent-Group instruction at both fifth and second grade. The evidence for more attention to individual differences in instruction continues to favor the middle SES schools in mathematics as well as in reading.

An overview of the success of instruction in these different contexts is available from the observer reports of the levels of target pupil productivity in each context. In comparing SES levels at the fifth grade, pupils in high SES schools had the highest levels of productivity and pupils in low SES classes had the lowest levels or productivity in contexts with the classroom as the instructional unit. The percent of gross productive time (Table 136) for second grade pupils in the Teacher-Group context was uniformly high across SES levels. While the level of productivity was judged high in Individual contexts and in contexts where an adult other than the teacher directed the instruction, these contexts occurred infrequently.

Comparisons of Time Allocation in Instructional Contexts in Reading and Mathematics for Urban, Suburban, and Rural Schools

In this discussion, the data are comparable to those summarizing time allocation in context for schools stratified by SES level. As in the preceeding section, the data for each context include the mean, median and range of time. Time is reported for each context in terms of the number of minutes, the number of productive minutes, the mean percent total minutes, the mean percent productive minutes, the mean percent gross time, and the mean percent gross productive time. As before, the computation of proportion of time which was productive was based only on classrooms in which time was allocated in a particular context. When teachers did not use a context, time data from their classrooms were not included in the productivity computations.

Tables 143 through 154 describe the time allocation variables for reading instruction. With the exception of rural fifth grade classrooms, time spent in Independent-Group contexts in reading ranked highest across grade level and location (Tables 143 and 149). Independent-Group work in reading is probably accompanied by some time spent in Teacher-Group instruction. If reading instruction is actually organized by group, the second ranked time in context should then be the Teacher-Group setting. This was the case in reading for all the classrooms at second grade and true also for the urban fifth grade. A different pattern occurred for the suburban and rural fifth grade. In the suburban stratification, Independent-Group and Teacher-Class contexts ranked first and second in mean time allocation, and in rural, Independent-Class and Independent-Group were in first and second order. The extent of organization or reading instruction by groups was reflected also by the total percent of time spent in the two group contexts (Tables 145 and 151). Teacher-Group and Independent-Group instruction occupied two-thirds of the time in the second and fifth grade urban classrooms, about 60 percent of the time in second grade suburban and rural classrooms, and only about 40 percent of the time in the fifth grade suburban and rural schools. The largest proportion of time spent in instruction of the class as a unit was in the fifth grade suburban and rural classrooms.

For these two groups, from 43 to 53 percent of class time was devoted to instruction in which pupils were working with the class as a unit where

Table 143

Mean Number of Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by Geographic Location-
GRADE 2

	Urban N=21			Suburban N=12			Rural N=6		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	7.19	.63	0- 65.00	4.58	.36	0-17.00	11.00	3.00	0-45.00
I-Class	2.95	.94	0- 21.00	4.41	.25	0-25.00	5.00	1.75	0-23.00
T-Group	19.86	19.00	0- 55.00	14.83	13.50	0-42.00	13.67	15.25	0-21.00
I-Group	22.91	15.25	0- 77.00	22.00	20.50	3-40.00	25.17	23.50	0-57.00
T-Individual	.10	.05	0- 2.00	.67	.17	0- 4.00	.00	.00	
I-Individual	9.76	.62	0-107.00	6.08	.71	0-36.00	.00	.00	
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	3.67	.78	0- 29.00	6.42	2.00	0-24.00	4.67	4.00	0-11.00
A-Individual	.29	.08	0- 3.00	.75	.25	0- 4.00	.00	.00	
Test	.24	.13	0- 5.00	.00	.00		1.17	.70	0- 7.00

Table 144

Mean Number Productive Minutes Per Student Per Day Spent in Contexts During Reading-Classrooms Stratified by Geographic Location-GRADE 2

	Urban N=21			Suburban N=12			Rural N=6		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	6.38	.63	0-64.00	3.92	.36	0-14.00	8.67	.50	0-37.00
I-Class	1.91	.33	0-18.00	3.92	.67	0-23.00	3.33	1.50	0-14.00
T-Group	14.00	13.75	0-30.00	12.17	10.00	0-29.00	12.83	15.00	0-19.00
I-Group	15.14	9.75	0-51.00	16.67	13.50	3-29.00	19.50	18.00	0-49.00
T-Individual	.10	.05	0- 2.00	.50	.17	0- 3.00	.00	.00	
I-Individual	7.10	.31	0-74.00	4.58	.50	0-30.00	.00	.00	
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	2.81	.63	0-25.00	5.42	2.00	0-20.00	3.50	2.50	0-10.00
A-Individual	.24	.08	0- 2.00	.58	.25	0- 2.00	.00	.00	
Test	.05	.03	0- 1.00	.00	.00		1.00	.60	0- 6.00

Table 145

Mean Percent Total Minutes Per Student Per Day Spent in Contexts During Reading-Classrooms Stratified by Geographic Location-GRADE 2

	Urban N=21			Suburban N=12			Rural N=6		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	10.71	2.19	0-100.00	7.92	2.50	0-34.00	21.83	6.00	0-100.00
I-Class	4.05	.94	0- 38.00	6.17	.50	0-43.00	6.33	1.50	0- 32.00
T-Group	34.76	27.63	0-100.00	23.33	22.50	0-55.00	24.83	26.00	0- 48.00
I-Group	32.29	27.50	0- 74.00	35.42	34.00	5-67.00	37.33	42.50	0- 58.00
T-Individual	.10	.05	0- 1.00	1.17	.33	0- 7.00	.00	.00	
I-Individual	7.86	1.23	0- 63.00	13.17	2.14	0-83.00	.17	.10	0- 1.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	6.76	.80	0- 46.00	11.75	2.00	0-47.00	7.00	5.50	0- 20.00
A-Individual	.67	.17	0- 7.00	1.50	.50	0- 7.00	.00	.00	
Test	.29	.15	0- 6.00	.08	.05	0- 1.00	1.83	1.10	0- 11.00

Table 146

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by Geographic Location-
GRADE 2

	Urban N=21				Suburban N=12				Rural N=6			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	64.20	70.00	16- 97.00	5	46.80	43.75	24-79.00	5	45.33	45.75	8- 81.00	3
I-Class	41.00	38.00	1- 87.00	4	50.75	49.00	10-95.00	4	42.00	42.00	18- 66.00	2
T-Group	52.50	47.50	4-100.00	20	53.55	54.25	15-91.00	11	78.00	77.00	60-100.00	5
I-Group	52.28	60.50	2- 81.00	18	53.33	54.50	25-89.00	12	57.60	59.25	26- 83.00	5
T-Individual	12.00	12.00	8- 16.00	2	20.00	21.25	10-25.00	3				0
I-Individual	26.63	20.50	5--75.00	8	41.25	40.00	8-77.00	4				0
A-Class				0				0				0
A-Group	39.00	32.50	12- 85.00	5	39.50	44.00	16-61.00	6	17.75	15.50	7- 33.00	4
A-Individual	17.00	17.75	8- 23.00	3	16.00	15.50	8-25.00	4	4.00	4.00		1
Test	2.00	2.00		1	4.00	4.00		1	24.00	24.00		1

Table 147

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by Geographic Location-
GRADE 2

	Urban N=21			Suburban N=12			Rural N=6		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	10.33	2.19	0-100.00	6.58	.36	0-27.00	20.83	5.50	0-100.00
I-Class	5.43	1.53	0- 44.00	5.83	.25	0-44.00	6.33	1.50	0- 32.00
T-Group	31.95	27.00	0-100.00	23.17	22.50	0-50.00	23.33	24.50	0- 42.00
I-Group	34.57	28.75	0- 74.00	36.92	37.50	6-60.00	38.33	44.50	0- 60.00
T-Individual	.14	.05	0- 2.00	1.25	.33	0- 7.00	.00	.00	
I-Individual	9.76	1.54	0- 89.00	12.33	1.07	0-81.00	.17	.10	0- 1.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	6.71	.20	0- 46.00	12.42	3.00	0-49.00	8.00	5.50	0- 20.00
A-Individual	.86	.33	0- 7.00	1.58	.75	0- 7.00	.00	.00	
Test	.38	.20	0- 8.00	.00	.00		2.83	1.70	0- 17.00

Table 148

Mean Percent Gross Productive Time Per Student Per Day Spent in Contexts During Reading-Classrooms Stratified by Geographic Location-GRADE 2

	Urban N=21				Suburban N=12				Rural N=6			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	88.80	91.50	72- 98.00	5	86.20	87.75	73- 96.00	5	91.00	91.00	82-100.00	3
I-Class	60.50	69.50	3-100.00	4	87.00	91.00	67- 99.00	4	73.00	73.00	61- 85.00	2
T-Group	73.95	85.00	9-100.00	20	87.18	90.00	70-100.00	11	94.40	96.25	83-100.00	5
I-Group	66.22	73.00	12- 98.00	18	78.67	78.50	63-100.00	12	77.20	79.75	54- 94.00	5
T-Individual	100.00	100.00		2	83.33	87.50	50-100.00	3				0
I-Individual	76.13	79.00	50- 94.00	8	80.75	83.00	57-100.00	4				0
A-Class				0				0				0
A-Group	73.00	71.50	65- 85.00	5	85.33	82.50	77- 98.00	6	75.50	82.00	41- 97.00	4
A-Individual	91.67	93.75	75-100.00	3	88.75	92.50	55-100.00	4	100.00	100.00		1
Test	12.00	12.00		1	33.00	33.00		1	87.00	87.00		1

Table 149

Mean Number of Minutes Per Student Per Day Spent in Contexts During Reading-Classrooms Stratified by Geographic Location-GRADE 5

	Urban N=24			Suburban N=13			Rural N=13		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	3.96	.90	0-18.00	15.85	1.29	0-80.00	5.15	1.29	0-35.00
I-Class	7.25	1.79	0-50.00	13.92	8.00	0-51.00	18.23	16.92	0-65.00
T-Group	15.88	16.00	0-40.00	7.92	3.25	0-34.00	5.39	1.75	0-20.00
I-Group	22.71	17.50	0-60.00	19.00	16.75	0-53.00	14.69	13.75	0-43.00
T-Individual	.08	.04	0- 2.00	.08	.04	0- 1.00	.00	.00	
I-Individual	2.58	.50	0-39.00	5.39	.63	0-30.00	2.54	1.38	0-33.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	1.21	.41	0-20.00	2.39	1.29	0-31.00	.00	.00	
A-Individual	.00	.00		.00	.00		.08	.04	0- 1.00
Test	.75	.39	0-18.00	.00	.00		.00	.00	

Table 150

Mean Number Productive Minutes Per Student Per Day Spent in Contexts During Reading - Classrooms Stratified by Geographic Location - GRADE 5

	Urban N=24			Suburban N=13			Rural N=13		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	3.33	.90	0-14.00	13.46	1.29	0-76.00	4.31	.94	0-34.00
I-Class	4.33	.36	0-30.00	10.08	3.75	0-40.00	13.85	10.50	0-53.00
T-Group	13.46	12.50	0-40.00	5.62	3.00	0-27.00	5.15	1.75	0-18.00
I-Group	17.04	13.00	0-46.00	13.85	11.00	0-48.00	10.85	9.50	0-28.00
T-Individual	.08	.04	0- 2.00	.00	.00		.00	.00	
I-Individual	2.00	.50	0-26.00	3.15	.22	0-19.00	2.08	1.13	0-27.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	.96	.27	0-17.00	2.00	1.08	0-26.00	.00	.00	
A-Individual	.00	.00		.00	.00		.08	.04	0- 1.00
Test	.63	.33	0-15.00	.00	.00		.00	.00	

Table 151

Mean Percent Total Minutes Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by Geographic Location-
GRADE 5

	Urban N=24			Suburban N=13			Rural N=13		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	8.92	1.80	0- 54.00	15.62	2.14	0-80.00	9.08	4.29	0- 42.00
I-Class	15.50	3.21	0-100.00	27.85	16.75	0-95.00	44.39	37.00	0-100.00
T-Group	27.71	29.25	0- 67.00	11.39	6.75	0-32.00	9.92	4.00	0- 29.00
I-Group	39.33	43.00	0- 89.00	28.00	27.25	0-95.00	31.54	34.50	0- 83.00
T-Individual	.29	.15	0- 7.00	.15	.08	0- 2.00	.00	.00	
I-Individual	3.58	.70	0- 51.00	11.77	1.88	0-55.00	4.85	2.63	0- 63.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	2.58	1.32	0- 33.00	2.54	1.38	0-33.00	.00	.00	
A-Individual	.00	.00		.00	.00		.23	.13	0- 3.00
Test	2.08	1.09	0- 50.00	.00	.00		.00	.00	

Table 152

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Reading -
Classrooms Stratified by Geographic Location -
GRADE 5

	Urban N=24				Suburban N=13				Rural N=13			
	X̄	Median	Range	Actual N	X̄	Median	Range	Actual N	X̄	Median	Range	Actual N
T-Class	54.00	49.25	9- 89.00	9	69.67	71.00	30-95.00	6	71.00	82.75	14-100.00	5
I-Class	41.90	36.50	5- 97.00	10	53.75	62.00	17-90.00	8	59.00	60.00	14-100.00	10
T-Group	60.50	64.00	14-100.00	20	46.29	45.25	36-58.00	7	51.00	49.25	9- 98.00	7
I-Group	64.39	71.50	25- 96.00	18	58.88	59.00	32-93.00	8	62.13	65.00	17- 88.00	8
T-Individual	25.00	25.00	--	1	3.00	3.00	--	1	--	--	--	0
I-Individual	34.00	26.50	16- 67.00	4	27.00	21.50	7-58.00	4	82.00	82.00	--	1
A-Class	--	--	--	0	--	--	--	0	--	--	--	0
A-Group	35.00	35.00	28- 42.00	2	50.00	50.00	--	1	--	--	--	0
A-Individual	--	--	--	0	--	--	--	0	8.00	8.00	--	1
Test	44.00	44.00	--	1	--	--	--	0	--	--	--	0

Table 153

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by Geographic Location-
GRADE 5

	Urban N=24			Suburban N=13			Rural N=13		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	8.42	2.10	0- 51.00	17.08	2.57	0-80.00	8.62	4.29	0- 41.00
I-Class	14.96	4.29	0-100.00	26.31	16.50	0-94.00	44.77	35.25	0-100.00
T-Group	28.00	29.50	0- 67.00	11.46	6.25	0-38.00	9.92	5.00	0- 28.00
I-Group	39.88	41.00	0- 86.00	30.85	30.75	0-95.00	31.85	35.00	0- 83.00
T-Individual	.29	.15	0- 7.00	.08	.04	0- 1.00	.00	.00	
I-Individual	4.04	.70	0- 51.00	11.39	1.56	0-67.00	4.77	2.58	0- 62.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	2.63	1.36	0- 33.00	2.77	1.50	0-36.00	.00	.00	
A-Individual	.00	.00		.00	.00		.15	.08	0- 2.00
Test	1.83	.96	0- 44.00	.00	.00		.00	.00	

Table 154

Mean Percent Gross Productive Time Per Student
Per Day Spent in Contexts During Reading-
Classrooms Stratified by Geographic Location-
GRADE 5

	Urban N=24				Suburban N=13				Rural N=13			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	85.22	88.50	65-100.00	9	86.67	90.50	73- 95.00	6	88.20	92.25	63-100.00	5
I-Class	59.70	61.50	10- 97.00	10	69.38	75.50	34-100.00	8	79.30	82.00	29-100.00	10
T-Group	84.70	88.75	50-100.00	20	79.29	82.75	35-100.00	7	94.57	94.00	90-100.00	7
I-Group	76.56	76.50	50- 95.00	18	71.75	71.00	54- 90.00	8	75.63	76.50	61- 94.00	8
T-Individual	100.00	100.00		1	50.00	50.00		1				0
I-Individual	86.75	91.50	67- 97.00	4	78.75	76.00	63-100.00	4	82.00	82.00		1
A-Class				0				0				0
A-Group	78.00	78.00	71- 85.00	2	83.00	83.00		1				0
A-Individual				0				0	71.00	71.00		1
Test	86.00	86.00		1				0				0

the assignment and expectancies were presumably the same for all class members. The uniformity of context which we are inferring from these data for suburban fifth graders needs to be contrasted with the fact that, on the average, 12 percent of their class time in reading was spent in Independent-Individual contexts--a higher proportion of time than was evident in the urban and rural fifth grade classrooms.

The reader will recall that the incidence of individual contexts reported in conjunction with pupil events was higher at the second grade suburban level. The time data confirm this finding in that the second grade suburban classrooms had the highest percent of time in individual contexts by school location. In addition more time was allocated to instruction by teacher-aides as the Adult-Group context information shows.

When instruction was administered by the teacher, as in the T-Class and T-Group contexts, the level of productivity as expressed by the percent of gross productive time (Tables 148 and 154) was higher regardless of location and grade level. Productivity levels in second grade reading were relatively uniform across contexts, but productivity was lower in the independent contexts, especially for the urban and rural classrooms. The poorest levels of observed productivity in fifth grade were again the Independent-Class and Independent-Group contexts even though these contexts accounted for a large proportion of time allocation in reading.

When one examines the tables reporting the time data (Tables 155 through 166), it is apparent that the schools vary considerably by location with respect to the organization of instruction in mathematics. In second grade, Teacher-Class instruction occupied more time than any other instructional context in all locations. Urban classrooms at fifth grade were organized overall to distribute roughly equivalent amounts of time to the several contexts, but Teacher-Class instruction again predominated. In the suburban and rural classrooms at fifth grade, the Independent-Class context was most common, followed by Teacher-Class instruction. In rural classrooms at the second grade level, 85 percent of the instructional time in mathematics was spent in Teacher-Class and Independent-Class instruction (Table 157). Suburban second grade classrooms ranked lowest with respect to amount of time devoted to instruction by class, but fifth grade suburban classrooms spent more time than either urban or rural fifth grade classes in these contexts. It is of some interest that time in the suburban classes at second grade was divided almost equally between group and class instruction, but that in these same schools at fifth grade, only a small portion of mathematics time was devoted to group instruction (Tables 155 and 161).

Mathematics instruction in the rural schools was carried on in individual contexts in only a few classes. Only three classes from urban and suburban settings reported time in individual contexts and a similarly small number of classes had instruction by an adult other than the teacher. These data along with those reported previously permit the inference that only a minimal amount of instruction in mathematics can be considered individualized, at least based on these time allocation data. While one might expect that individual instruction would produce more interest on the part of the pupils and consequently greater evidence of productivity, the time data do not support such an assumption (Tables 158, 160, 164 and 166). Productivity was very often as great or greater in Teacher-Class instruction regardless of grade level or location.

Table 155

Mean Number of Minutes Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by Geographic Location-
GRADE 2

	Urban N=19			Suburban N=12			Rural N=6		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	15.32	12.50	0-45.00	11.92	7.00	0-46.00	20.50	14.00	8-50.00
I-Class	4.53	1.46	0-28.00	5.75	4.00	0-17.00	11.67	8.00	0-27.00
T-Group	6.63	.36	0-33.00	5.33	4.00	0-20.00	.83	.50	0- 3.00
I-Group	7.79	2.50	0-34.00	9.75	10.50	0-23.00	3.33	1.00	0-11.00
T-Individual	.00	.00		.00	.00		.00	.00	
I-Individual	1.11	.09	0-13.00	4.17	.83	0-30.00	.17	.10	0- 1.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	.47	.18	0- 6.00	1.58	.50	0-10.00	1.17	.75	0- 4.00
A-Individual	.37	.13	0- 3.00	.00	.00		.00	.00	
Test	.00	.00		.75	.41	0- 9.00	.00	.00	

Table 156

Mean Number Productive Minutes Per Student Per Day Spent in Contexts During Mathematics-Classrooms Stratified by Geographic Location-GRADE 2

	Urban N=19			Suburban N=12			Rural N=6		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	11.42	9.25	0-34.00	10.42	5.50	0-41.00	16.17	12.50	5-34.00
I-Class	2.95	.69	0-16.00	4.25	2.50	0-14.00	8.17	3.00	0-24.00
T-Group	4.84	.36	0-29.00	5.08	3.00	0-20.00	.83	.50	0- 3.00
I-Group	5.68	1.75	0-27.00	7.17	8.00	0-18.00	2.50	1.00	0- 9.00
T-Individual	.00	.00		.00	.00		.00	.00	
I-Individual	.90	.09	0-10.00	3.33	.67	0-24.00	.17	.10	0- 1.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	.37	.12	0- 5.00	1.25	.33	0-10.00	.50	.30	0- 3.00
A-Individual	.16	.09	0- 1.00	.00	.00		.00	.00	
Test	.00	.00		.75	.41	0- 9.00	.00	.00	

Table 157

Mean Percent Total Minutes Per Student Per Day Spent in Contexts During Mathematics-Classrooms Stratified by Geographic Location-GRADE 2

	Urban N=19			Suburban N=12			Rural N=6		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	43.90	43.50	0-100.00	28.58	18.50	0-79.00	59.83	55.00	19-100.00
I-Class	10.74	2.04	0- 68.00	13.08	8.50	0-36.00	25.50	16.00	0- 67.00
T-Group	16.16	1.09	0-100.00	15.58	11.50	0-45.00	2.83	1.50	0- 9.00
I-Group	21.63	8.25	0- 74.00	27.25	25.00	0-67.00	8.50	2.50	0- 37.00
T-Individual	.53	.28	0- 10.00	.08	.05	0- 1.00	.00	.00	
I-Individual	2.42	.28	0- 22.00	8.25	2.83	0-48.00	.67	.40	0- 4.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	1.58	.59	0- 20.00	4.58	1.00	0-34.00	2.67	2.00	0- 8.00
A-Individual	.79	.13	0- 5.00	.17	.09	0- 2.00	.00	.00	
Test	.00	.00		2.50	1.36	0-30.00	.00	.00	

Table 158

Mean Percent Productive Minutes Per Student Per Day Spent in Contexts During Mathematics-Classrooms Stratified by Geographic Location-GRADE 2

	Urban N=19				Suburban N=12				Rural N=6			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	66.08	67.25	26-88.00	13	62.50	65.50	15-95.00	8	70.17	75.00	26-95.00	6
I-Class	57.00	63.50	6-95.00	6	41.17	36.00	26-73.00	6	52.50	50.50	20-89.00	4
T-Group	45.00	38.50	3-88.00	8	50.63	49.00	23-85.00	8	10.67	10.00	7-17.00	3
I-Group	44.30	51.50	10-80.00	10	50.33	49.25	7-87.00	9	24.33	22.75	17-38.00	3
T-Individual				0	17.00	17.00		1				0
I-Individual	14.00	15.00	4-20.00	3	29.00	30.00	14-40.00	3	17.00	17.00		1
A-Class				0				0				0
A-Group	11.50	11.50	8-15.00	2	30.33	31.00	8-50.00	3	17.00	17.00		0
A-Individual	10.33	10.25	10-11.00	3	8.00	8.00		1				0
Test				0	42.00	42.00		1				0

Table 159

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by Geographic Location -
GRADE 2

	Urban N=19			Suburban N=12			Rural N=6		
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	43.42	39.75	0-100.00	28.58	20.50	0-86.00	56.83	46.50	20-100.00
I-Class	12.62	4.38	0- 69.00	13.00	7.00	0-41.00	26.83	20.00	0- 68.00
T-Group	16.37	.73	0-100.00	14.00	6.50	0-44.00	3.50	1.00	0- 15.00
I-Group	21.21	8.25	0- 74.00	28.50	25.00	0-69.00	8.17	3.50	0- 28.00
T-Individual	.05	.03	0- 1.00	.08	.05	0- 1.00	.00	.00	
I-Individual	4.00	.28	0- 38.00	8.92	2.83	0-49.00	1.00	.60	0- 6.00
A-Class	.00	.00		.00	.00		.00	.00	
A-Group	1.79	.88	0- 19.00	4.83	1.00	0-33.00	4.00	2.75	0- 13.00
A-Individual	.95	.40	0- 7.00	.08	.05	0- 1.00	.00	.00	
Test	.00	.00		2.08	1.14	0-25.00	.00	.00	

Table 160

Mean Percent Gross Productive Time Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by Geographic Location-
GRADE 2

	Urban N=19				Suburban N=12				Rural N=6			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	74.39	76.63	55- 91.00	13	87.00	90.50	63- 99.00	8	79.50	80.50	60- 95.00	6
I-Class	72.33	79.00	34- 95.00	6	74.00	71.00	55- 99.00	6	72.75	79.00	33-100.00	4
T-Group	69.13	67.50	36-100.00	8	94.88	98.00	81-100.00	8	93.33	95.00	80-100.00	3
I-Group	72.70	79.50	30-100.00	10	74.89	79.50	48- 89.00	9	79.67	80.00	58-100.00	3
T-Individual				0	100.00	100.00		1				0
I-Individual	76.33	76.50	67- 85.00	3	80.67	80.50	79- 83.00	3	100.00	100.00		1
A-Class				0				0				0
A-Group	77.50	77.50	75- 80.00	2	100.00	100.00		3	100.00	100.00		1
A-Individual	80.33	81.25	57-100.00	3	100.00	100.00		1				0
Test				0	100.00	100.00		1				0

Table 161

Mean Number of Minutes Per Student
Per Day Spent in Contexts During Mathematics-
Classrooms Stratified by Geographic Location-
GRADE 5

	Urban	N=22		Suburban	N=9		Rural	N=14	
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	13.77	10.50	0-50.00	16.44	13.00	0-42.00	11.14	7.50	0-40.00
I-Class	9.05	1.25	0-42.00	24.33	26.25	0-58.00	17.07	19.00	0-45.00
T-Group	9.55	7.00	0-27.00	.33	.14	0- 2.00	3.64	.56	0-18.00
I-Group	13.09	13.50	0-37.00	5.44	1.20	0-22.00	11.64	5.75	0-52.00
T-Individual	.00	.00		.11	.06	0- 1.00	.00	.00	
I-Individual	.27	.10	0- 4.00	2.78	1.14	0-17.00	.00	.00	
A-Class	2.77	1.05	0-40.00	.00	.00		.00	.00	
A-Group	.05	.02	0- 1.00	.00	.00		.07	.04	0- 1.00
A-Individual	.05	.02	0- 1.00	.00	.00		.07	.04	0- 1.00
Test	.05	.02	0- 1.00	2.56	1.20	0- 8.00	.79	.25	0- 8.00

Table 162

Mean Number of Productive Minutes Per Student Per Day Spent in Contexts During Mathematics-Classrooms Stratified by Geographic Location-GRADE 5

	Urban N=22			Suburban N=9			Rural N=14		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	10.41	8.00	0-33.00	13.22	9.25	0-33.00	8.64	6.50	0-33.00
I-Class	6.91	1.25	0-26.00	15.11	13.25	0-40.00	11.86	12.50	0-30.00
T-Group	7.14	6.50	0-21.00	.22	.13	0- 2.00	2.93	.40	0-17.00
I-Group	9.91	11.00	0-28.00	1.78	.80	0-18.00	9.07	4.25	0-45.00
T-Individual	.00	.00		.00	.00		.00	.00	
I-Individual	.00	.00		1.78	.43	0-13.00	.00	.00	
A-Class	2.05	.70	0-31.00	.00	.00		.00	.00	
A-Group	.05	.02	0- 1.00	.00	.00		.07	.04	0- 1.00
A-Individual	.05	.02	0- 1.00	.00	.00		.07	.04	0- 1.00
Test	.05	.02	0- 1.00	2.22	1.20	0- 6.00	.71	.17	0- 8.00

Table 163

Mean Percent Total Minutes Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by Geographic Location -
GRADE 5

	Urban N=22			Suburban N=9			Rural N=14		
	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range	$\overline{X}$	Median	Range
T-Class	28.32	23.00	0-100.00	31.44	24.00	0-81.00	23.14	14.50	0- 80.00
I-Class	20.59	3.33	0- 83.00	37.56	41.75	0-96.00	43.43	42.00	0-100.00
T-Group	19.82	15.00	0- 59.00	.56	.29	0- 3.00	7.00	1.39	0- 43.00
I-Group	25.14	22.50	0- 65.00	11.22	2.40	0-54.00	24.43	14.50	0- 82.00
T-Individual	.05	.02	0- 1.00	.00	.00		.00	.00	
I-Individual	.64	.20	0- 10.00	8.89	4.29	0-50.00	.00	.00	
A-Class	5.09	1.95	0- 73.00	.00	.00		.00	.00	
A-Group	.05	.02	0- 1.00	.00	.00		.14	.08	0- 2.00
A-Individual	.05	.02	0- 1.00	.00	.00		.29	.15	0- 4.00
Test	.09	.05	0- 2.00	7.89	2.00	0-40.00	1.71	.33	0- 20.00

Table 164

Mean Percent Productive Minutes Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified By Geographic Location -
GRADE 5

	Urban N=22				Suburban N=9				Rural N=14			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	63.13	61.50	13-98.00	15	63.00	79.00	20-86.00	6	77.50	80.00	53-100.00	8
I-Class	66.40	63.00	27-97.00	10	51.14	51.25	10-88.00	7	56.55	53.75	33- 87.00	11
T-Group	49.29	47.50	20-92.00	14	32.50	32.50	3-62.00	2	45.00	35.50	16- 93.00	4
I-Group	49.00	52.50	8-86.00	16	39.50	40.00	18-60.00	4	49.88	44.00	17- 87.00	8
T-Individual	6.00	6.00		1	1.00	1.00		1				0
I-Individual	1.00	1.00		1	26.00	26.00	13-39.00	2				0
A-Class	62.50	62.50	47-78.00	2				0				0
A-Group	4.00	4.00		1				0	22.00	22.00		1
A-Individual	4.00	4.00		1				0	8.00	8.00		1
Test	20.00	20.00		1	30.50	30.50	11.50.00	4	35.50	35.50	21- 50.00	2

Table 165

Mean Percent Gross Time Per Student
Per Day Spent in Contexts During Mathematics -
Classrooms Stratified by Geographic Location -
GRADE 5

	Urban	N=22		Suburban	N=9		Rural	N=14	
	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range	$\bar{X}$	Median	Range
T-Class	28.41	23.50	0-100.00	33.22	31.75	0-81.00	23.00	14.00	0- 80.00
I-Class	20.23	2.92	0- 82.00	42.33	46.25	0-95.00	43.21	43.00	0-100.00
T-Group	19.82	13.50	0- 65.00	.56	.29	0- 3.00	7.79	1.67	0- 43.00
I-Group	25.77	26.50	0- 66.00	10.78	2.80	0-48.00	23.93	15.00	0- 74.00
T-Individual	.05	.02	0- 1.00	.11	.06	0- 1.00	.00	.00	
I-Individual	.64	.20	0- 10.00	6.89	3.71	0-36.00	.00	.00	
A-Class	4.77	1.60	0- 73.00	.00	.00		.00	.00	
A-Group	.05	.02	0- 1.00	.00	.00		.14	.08	0- 2.00
A-Individual	.09	.05	0- 2.00	.00	.00		.14	.08	0- 2.00
Test	.09	.05	0- 2.00	6.44	2.00	0-26.00	1.86	.50	0- 20.00

Table 166

Mean Percent Gross Productive Time Per Student Per Day Spent in Contexts During Mathematics - Classrooms Stratified by Geographic Location - GRADE 5

	Urban N=22				Suburban N=9				Rural N=14			
	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N	$\bar{X}$	Median	Range	Actual N
T-Class	78.07	77.50	60- 98.00	15	81.33	82.50	67- 90.00	6	79.63	81.50	52-100.00	8
I-Class	82.60	85.50	55-100.00	10	63.29	66.75	30- 89.00	7	72.18	72.50	45-100.00	11
T-Group	79.36	79.00	58-100.00	14	75.00	75.00	50-100.00	2	92.00	92.00	89- 95.00	4
I-Group	75.50	77.50	36- 92.00	16	73.25	72.50	48-100.00	4	78.88	78.50	56-100.00	8
T-Individual	100.00	100.00		1	20.00	20.00		1				0
I-Individual	14.00	14.00		1	58.00	58.00	38- 78.00	2				0
A-Class	73.00	73.00	68- 78.00	2				0				0
A-Group	80.00	80.00		1				0	67.00	67.00		1
A-Individual	70.00	70.00		1				0	75.00	75.00		1
Test	100.00	100.00		1	88.25	88.50	76-100.00	4	91.50	91.50	83-100.00	2

In general, these statistics contrasting average incidences of observation variables and time allocation measures in classrooms stratified by SES and location do show that demographic variables are related to differences in classroom performance. Where no SES or location differences exist among the observation variables, we can conclude that future research on teacher performance variables utilizing observation variables as measures would not have to take into account independent factors such as the SES level of the school population or whether the school was located in a rural, suburban or urban area.

APPENDIX C

Factor Analysis and Factor Validity Studies for APPLE Observation Variables

In Appendix C, results of factor analyses of APPLE variables for three major categories of the observation system are reported. Following the results of these analyses is presented an examination of the relationships of the factor scores derived from the analyses to pupil outcome measures in reading, mathematics and attitude.

Factor Analysis of Observational Variables

In an effort to tease out any empirical relationships among groups of variables within an observational category, factor analyses were conducted of the pupil events, contexts, teacher activities and teacher responses by grade and instructional area. We recognized that a factor analysis of the observation variables isolated from one another into categories rather than analyzed together as interaction units (such as teacher activity-pupil event combinations or pupil event-teacher response combinations) would provide an incomplete picture of classroom happenings. We conducted the analyses with this knowledge in mind, in order to identify particular aspects of an observational record which would support the generation of hypotheses about observable pupil or teacher characteristics associated with end of year outcomes. Utilization of factor scores derived from the analysis was dependent on the interpretability of each of the factor dimensions. If the variables which defined each dimension could be understood to reflect behavioral, management, teaching or response styles, we accepted them for further analysis.

The factor analysis of pupil events produced dimensions which were difficult to interpret. However, the factor analyses of contexts, teacher activities and teacher responses provided dimensions which appeared to have substantial psychological meaning. Our rationale for the APPLE Observation

System is based on the belief that citations of pupil behavior in the absence of descriptions of the setting or the instructional behavior of the teacher have limited meaning. We were not surprised, therefore, that the factor dimensions for the pupil behavior events were difficult to interpret, believing as we do that the common factors accounting for the interrelationship among the pupil variables might be particular instructional contexts or teacher activities. For example, we found that "Direction Following" was positively related to incidences of "Attentiveness" in one dimension, and negatively related to incidences of "Attentiveness" in another dimension. Our notion is that the reason for this apparently conflicting result is that pupils can be both attentive and follow directions in contexts where teachers are closely in charge of the instruction, while the behavior of these same pupils in contexts where they are working independently of the teacher may evidence inattention even though they are following directions. At a future time we propose to conduct factor analyses of pupil behavior in conjunction with contexts, activities and responses in order to define meaningful classroom interaction units based on naturally appearing teacher-pupil behaviors.

The reader is correct in wondering whether we have a sufficient rationale for using Contexts, Teacher Activities and Teacher Responses as isolated observation variables in factor analyses when we have considered the results of factor analyses of pupil variables to be incomplete when studied in isolation of teaching behavior. The following report of the factor analyses of these observational characteristics of teaching rest on the assumption that the way teachers organize their classroom learning experiences (contexts), their instructional behavior (activities) and their responses (teacher responses) represent stylistic differences between teachers which may be relatively independent of the characteristics of their pupils. The appropriateness of such an assumption must be tested. For the hypothesis-generating objective of the Phase II BTES study, we believed that we did have sufficient basis to assume that we could analyze teacher behavior independently of pupil behavior.

Instructional contexts. The results of the factor analyses for reading instructional contexts for second grade and for fifth grade, clustered the variables in different ways. At the second grade level (Table 167) the dimensions were Total Classroom Instruction, Group Instruction and Individualized Instruction, a factor which reflects the extent to which children in the classrooms work independently of the teacher on assignments which are different from those of their classmates. Each of the two dimensions for contexts at fifth grade (Table 168), Independent Work by Class and Teacher Instruction of Class were defined by a negative loading on group instruction variables. The first factor, Teacher-Group contexts, had a negative coefficient while the coefficient for the Independent-Class contexts was positive. Independent-Group contexts had a negative loading and Teacher-Class context had a positive loading on the second factor. The factor dimensions from the analysis of instructional contexts for mathematics were identical at both grades (Tables 169 and 170). They were Teacher Instruction of Class, Independent Work by Class and Group Instruction.

Teacher activities. The factor analysis of teacher activities yielded multiple dimensions, differing between grade levels and instructional areas. Teacher activities associated with introducing a lesson were, however, common to all classroom groups (Tables 171 through 174). "Circulating" around the

Table 167

Factor Pattern Matrix for Instructional Contexts

in Reading -- Grade 2

	Factors		
Contexts	Total Classroom Instruction	Group Instruction	Individualized Instruction
A - Group	-.09	.49*	-.06
I - Class	.53*	-.18	-.05
I - Group	-.35*	-.12	-.15
I - Individual	-.03	-.05	.45*
T - Class	.34*	.13	-.18
T - Group	-.17	-.24*	-.18

Table 168

Factor Pattern Matrix for Instructional Contexts in Reading -- Grade 5

	Factors	
Contexts	Independent Work by Class	Teacher Instruction of Class
A - Group	-.16	-.08
I - Class	.82*	-.11
I - Group	-.32	-.38*
I - Individual	.16	-.04
T - Class	-.15	.73*
T - Group	-.56*	-.16

Table 169

Factor Pattern Matrix for Instructional Contexts in Mathematics -- Grade 2

Contexts	Factors		
	Teacher Instruction of Class	Independent Work by Class	Group Instruction
A - Group	-.21	-.38*	-.33*
I - Class	-.24	.49*	-.07
I - Group	-.24	-.34*	-.09
I - Individual	-.43	.14	-.29
T - Class	.67*	-.01	-.06
T - Group	-.15	-.03	.48*

Table 170

Factor Pattern Matrix for Instructional Contexts in Mathematics -- Grade 5

Contexts	Factors		
	Independent Work by Class	Teacher Instruction of Class	Group Instruction
A - Group	-.18	-.29	-.31
I - Class	.70*	-.08	-.08
I - Group	-.37	-.49*	-.07
I - Individual	-.34	-.02	-.31
T - Class	-.29	.67*	-.09
T - Group	-.17	-.09	.46*

Table 171

Factor Pattern Matrix for Teacher Activities in Reading -- Grade 2

Teacher Activities	Factors: Noninteractive Supervision	Discussing and Giving Instructions about Lessons	Teacher Directed Instruction	Introducing and Answering Questions About Lessons	Circulating	Checking and Listening to Pupil Reading
Academic Organizing	-.01	-.04	-.06	.57*	-.01	.05
Answering	.02	.02	.02	.57*	.02	-.10
Asking	-.18	.56*	.35*	.00	-.12	.01
At Desk	.85*	.02	.00	-.06	.01	.01
At Board	.12	-.31	.62*	-.03	.07	-.01
Checking	-.15	-.11	.02	-.03	.11	.28*
Circulating	-.06	-.01	-.19	-.05	.56*	.01
Discussing	.07	.84*	-.09	-.15	.07	-.05
Explaining	-.05	.03	-.00	-.[illegible]1	-.19	.08
Helping	-.14	-.12	-.08	-.04	.17	-.11
Instruction Giving	.03	.77*	-.03	.16	.01	.05
Listening	.11	.04	-.04	-.03	-.02	.35*
Question & Answer	-.14	-.13	.06	.17	.09	.13
Supervising	.84*	.00	.01	.07	-.02	-.01
Working with Individual, Class or Group	-.04	-.11	-.25*	-.05	-.52*	-.00

Table 172

Factor Pattern Matrix for Teacher Activities in Reading -- Grade 5

Teacher Activities	Factors					
	Giving Intructions at Board	Instructing Groups or Individuals	Introducing Lesson	Noninteractive Supervision	Circulating	Discussing And Explaining Lesson
Academic Organizing	-.07	.01	.45*	-.20*	-.02	-.15
Answering	.02	-.27	.03	-.11	.10	-.04
Asking	-.08	.15	-.20	-.11	-.19	-.02
At Desk	-.03	-.12	-.01	.56*	-.06	-.04
At Board	.73*	.13	.08	-.01	.10	.10
Checking	-.12	-.19	-.07	-.05	.06	-.24*
Circulating	-.05	-.15	-.08	-.12	.51*	-.07
Discussing	-.22	-.13	-.12	-.12	-.13	.36*
Explaining	-.07	-.18	-.02	-.11	-.12	.38*
Helping	.00	-.08	.52*	.11	-.06	.08
Instruction Giving	.72*	-.11	-.08	-.02	-.10	-.08
Listening	-.10	-.01	.18	-.10	-.10	-.09
Question & Answer	.02	-.33*	-.09	-.25*	-.32*	-.24*
Supervising	.16	-.15	.06	-.12	.06	.33*
Working with Individual, Class or Group	-.01	.70*	-.02	-.05	-.03	-.02

Table 173

Factor Pattern Matrix for Teacher Activities in Mathematics -- Grade 2

Teacher Activities	Factors						
	Introducing and Answering Questions About Lessons	Asking Questions About Problems	Teacher Directed Instruction	Instructing By Drill And Review	Helping Interactions With Pupils	Available For Help	Checking And Explaining Errors
Academic Organizing	.63*	.03	.12	-.10	.07	.05	-.00
Answering	.65*	-.04	-.16	.09	-.07	-.03	-.03
Asking	-.02	.63*	-.03	.02	-.07	-.00	.03
At Desk	-.14	-.04	-.10	.06	-.09	.33*	-.04
At Board	.22	.01	.06	-.05	-.04	.30*	-.00
Checking	-.07	-.07	-.04	-.04	-.04	-.02	.39*
Circulating	-.16	-.12	-.45*	-.06	.02	.10	-.07
Discussing	-.15	.07	-.01	-.19*	-.11	-.20*	-.20*
Explaining	.02	.41*	.02	-.02	.07	-.01	.21*
Helping	.05	-.03	-.13	.09	.41*	-.07	-.02
Instruction Giving	-.14	.25	-.00	.36*	.02	.12	-.05
Listening	.03	.64*	-.00	-.03	.06	-.01	-.10
Question & Answer	.01	-.18	.14	.44*	.08	-.05	-.01
Supervising	.18	-.00	-.14	.24*	-.24*	-.14*	.02
Working with Individual, Class or Group	-.06	-.06	.60*	.02	-.04	.02	-.04

Table 174

Factor Pattern Matrix for Teacher Activities in Mathematics -- Grade 5

Teacher Activities	Factors						
	Asking Questions About Problems	Introducing and Answering Questions About Lessons	Instructing Groups or Individuals	Circulating	At Desk	Checking Pupil Work	Class Or Group Discussion
Academic Organizing	.02	.50*	.16	.02	-.01	.05	.06
Answering	-.02	.57*	-.18	-.03	-.01	-.06	-.04
Asking	.55*	-.01	-.00	.05	-.02	.03	.04
At Desk	-.05	-.05	-.06	-.02	.36*	-.01	-.03
At Board	.29*	-.08	-.07	-.20*	-.00	-.10	.04
Checking	.03	-.04	-.09	-.02	-.00	.36*	.01
Circulating	-.10	-.08	-.06	.32*	-.11	-.03	.04
Discussing	.03	-.01	-.00	-.01	-.08	-.01	.27*
Explaining	-.09	-.10	-.19	-.03	-.22*	-.04	-.20*
Helping	-.25*	-.04	-.33*	-.14*	-.03	.04	.11*
Instruction Giving	-.00	-.04	-.22	-.06	.02	-.18*	.06
Listening	.50*	-.01	-.07	-.12	-.04	.00	-.04
Question & Answer	.01	.12	.20	-.16*	-.02	.04	-.12*
Supervising	.23	.04	-.09	.27*	.08	-.04	-.05
Working with Individual, Class or Group	-.05	-.07	.54*	-.04	-.02	-.05	.02

room was the teacher activity with highest loading on a second factor (called Circulating) which was common to second reading instruction (Table 171) and reading and mathematics lessons at fifth grade (Tables 172 and 174). A dimension which can be generically described Discussion was also defined for second grade reading and fifth grade reading and mathematics. A similar dimension which can be called Asking was present in the analysis of activities for second and fifth grade mathematics. In reading lessons at second and fifth grade there was a dimension which we called Noninteractive Supervision. Teacher Directed Instruction and Checking were two other dimensions for second grade teacher activities. Helping, Instructing by Drill and Review, and Available for Help were the additional factors for second grade mathematics. Instructing Groups or Individuals was a dimension common to fifth grade reading and mathematics. Giving Instruction at Board was a final factor for fifth grade reading, and At Desk and Checking Pupil Work exhausted the dimensions of teacher activities associated with fifth grade mathematics.

In summary, the factors defining teacher activities might be described as reflecting organizing activities which introduce the lesson, instructions about the lesson, circulating around the room while pupils work, non-interactive supervision, and several additional types of instructional work with pupils depending on the grade level and instructional area.

Teacher responses. Four dimensions of teacher response occurred with considerable regularity across grade level and type of instruction (Table 175 through 178). A tendency to give No Response to pupil behavior was a dimension in the second grade reading and mathematics lessons and in fifth grade mathematics. A Positive Reinforcement Responses dimension was common to all, except fifth grade mathematics. A Negative Reinforcement Responses

Table 175

Factor Pattern Matrix for Teacher Responses

to Pupil Events in Reading -- Grade 2

Teacher Responses	Factors				
	No Response	Positive Reinforcement Responses	Instructional Feedback Responses	Neutral Feedback Responses	Strong Positive Reinforcement Responses
Instructing	-.25	.01	.60*	.11	-.06
Discipline	-.44	-.42*	.15	-.13	.07
Help	-.34	-.07	-.06	-.36*	.07
Ignoring	-.50	-.22	-.18	-.32*	-.24*
Moves On	-.26	-.06	-.12	.29*	-.31*
Negative Feedback	-.11	-.10	.20	.04	-.22
None	.87*	-.05	-.02	-.02	-.03
Positive Feedback	-.28	.63*	.02	-.07	-.03
Praise	-.19	-.06	-.05	.03	.58*
Questioning	-.21	-.14	.05	.57*	.03
Recognizing	.02	.16	-.43*	.24	.07
Redirection	-.48	-.12	-.39*	.08	-.09

Table 176

Factor Pattern Matrix for Teacher Responses to Pupil Events in Reading -- Grade 5

Teacher Responses	Factors				
	Negative Reinforcement Responses (Behavior)	Negative Reinforcement Responses (Academic)	Neutral Feedback Responses	Positive Reinforcement Responses	Instructional Helping Responses
Instructing	-.04	.34*	.14	-.01	-.03
Discipline	.29*	-.32*	.11	.02	.02
Help	-.02	-.05	.01	.03	.34*
Ignoring	-.06	-.08	.31*	-.12	-.14*
Moves On	-.03	-.12	.10	.23*	-.20*
Negative Feedback	.41*	.21*	.02	.01	-.01
None	-.02	-.11	-.33*	-.07	-.05
Positive Feedback	-.10	-.09	.08	-.10	.12
Praise	-.10	-.07	.01	.33*	-.00
Questioning	-.02	-.04	.22*	.02	.13*
Recognizing	.08	.12	-.05	.30*	.08
Redirection	.63*	-.05	-.01	-.02	-.00

Table 177

Factor Pattern Matrix for Teacher Responses

to Pupil Events in Mathematics -- Grade 2

Teacher Responses	Factors				
	No Response	Positive Reinforcement Responses	Ignoring Responses	Negative Reinforcement Responses	Questioning Responses
Instructing	-.23	-.44*	-.17	-.24	-.14
Discipline	-.28	.24	.23	.30*	.09
Help	-.46	-.14	-.40*	-.18	.04
Ignoring	-.21	-.10	.62*	-.09	-.04
Moves On	-.06	-.07	-.22	.57*	-.06
Negative Feedback	-.19	-.12	-.05	.60*	-.01
None	.91*	-.03	-.02	-.02	-.02
Positive Feedback	-.48	-.28	.05	-.02	-.16
Praise	-.02	.59*	-.06	-.02	-.10
Questioning	-.13	-.06	-.05	-.02	.60*
Recognizing	-.37	.65*	-.16	-.16	-.11
Redirection	-.02	-.11	-.11	.33*	-.16

Table 178

Factor Pattern Matrix for Teacher Responses to Pupil Events in Mathematics -- Grade 5

Teacher Responses	Factors				
	Negative Reinforcement Responses (Behavior)	No Response	Redirecting Responses	Verbal Reinforcement Responses	Non-verbal Acknowledgement Responses
Instructing	-.10	-.34*	-.01	-.09	-.20*
Discipline	.38*	-.10	.02	-.16	-.10
Help	-.24	-.19	-.40*	-.07	.01
Ignoring	.56*	-.11	.00	-.08	-.00
Moves On	.53*	.03	-.05	.10	.06
Negative Feedback	-.12	-.14	-.09	.24*	.11
None	-.09	.50*	-.03	-.08	-.04
Positive Feedback	-.01	-.07	-.02	.46*	-.03
Praise	.12	.10	.22	.24*	-.12
Questioning	.08	.00	-.30*	.03	-.22*
Recognizing	.06	-.09	-.05	-.06	.32*
Redirection	-.18	-.19	.43*	-.07	-.01

dimension occurred for second grade mathematics and fifth grade reading and mathematics, while a Neutral Feedback Responses dimension appeared in second and fifth grade reading. Additional teacher response dimensions at second grade were Instructional Feedback Responses in reading, and Ignoring Responses and Questioning Responses in mathematics. There was an Instructional Helping Responses factor in fifth grade reading and three additional management dimensions in fifth grade mathematics--Redirecting Responses, Verbal Reinforcement Responses and Non-verbal Acknowledgement Responses. We assigned labels to the teacher response dimensions on the basis of the variables which were most salient to each and attempted to find terms which were common to as many of the grade level and instructional programs as possible.

Partial Correlations of Factor Scores from the Analysis of Instructional Context, Teacher Activities and Teacher Responses with Reading Outcome Measures

The data presented in the main body of this report contrasted grade level differences in the relationship of the observational variables to outcome measures. These findings lead to the expectation that the magnitudes and directions of correlations of the observation variable factor scores with outcome measures might also differ with respect to grade.

Instructional Context. Such differences were evident in the data presented in Table 179, which showed that the factor scores representing instruction by class were positively correlated with the decoding test at second grade level and negatively correlated at fifth grade level. The fifth grade Independent Work by Class factor was significantly correlated with the reading achievement outcome. This implies that reading achievement is facilitated when pupils work independently of the teacher. Factor scores of the incidence of different types of contexts reflect types of instructional organization. Few of these factor measures are correlated with reading

Table 179

Partial Correlations of BTES APPLE Factor Scores for Instructional Contexts with Spring Outcome Measures Controlling for Fall Scores - Reading Tests

	CAT Reading	Reading Application	Decoding Total	Reading Achievement	Total Academic Reading
GRADE 2 FACTORS					
Total Classroom Instruction	-.12	-.02	.22*	.15	-.01
Group Instruction	-.08	.09	.15	.13	.11
Individualized Instruction	.12	-.06	.02	.17	.05
GRADE 5 FACTORS					
Independent Class Work	-.14	.01	-.13	.28*	.02
Teacher Instruction of Class	.10	-.09	-.38*	.07	-.08

* $p \leq .10$

achievement outcomes, suggesting that instructional organization per se is not necessarily a critical variable in predicting reading achievement.

Teacher activities. Among the teacher activity factors (Table 180), it is of interest that the factor labeled Teacher-directed Instruction was positively correlated with the decoding test, but negatively correlated with the California Achievement Test. This finding, and the fact that the Total Classroom Instruction context dimension was also positively correlated with the decoding test, provides confirmatory evidence that the extent to which teachers direct learning activities in second grade reading is related to pupil gain in decoding skills, but not to other types of reading achievement. Decoding skills may be learned best at this grade level from teachers who direct the learning experiences, while reading comprehensions skills may best be acquired in classrooms where teachers provide more opportunities for interacting with the lesson material. This explanation is further supported by the fact that the extent of Non-interactive Supervision is negatively correlated with decoding at second grade and that Discussing and Giving Instructions was positively correlated with the California Achievement Test.

At fifth grade level the Giving Instructions at Board factor has a negative relationship to decoding skills and Circulating was negatively correlated with the California Achievement Test. More interactive or neutral involvement of teachers as reflected in the Discussing and Explaining Lesson or the Non-interactive Supervision factors appear to promote the general reading skills of fifth graders as the data in Table 180 indicate.

Teacher responses. The differing relationships between teacher behavior and reading achievement at second and fifth grade levels are well-illustrated by the correlations of teacher response factor scores with the reading achievement outcomes measures (Table 181). The Positive

Table 180

Partial Correlations of BTES APPLE Factor Scores for Teacher Activities with Spring Outcome Scores Controlling for Fall Scores - Reading Tests

	CAT Reading	Reading Application	Decoding Total	Reading Achievement	Total Academic Reading
GRADE 2 FACTORS					
Noninteractive Supervision	.01	.07	-.21*	.01	.01
Discussing & Giving Instructions	.27*	-.08	-.16	-.05	.03
Teacher Directed Instruction	-.21*	-.17	.31*	-.05	-.18
Introducing & Answering Questions	-.14	.04	-.04	.18	-.02
Circulating	-.06	-.11	.05	.20	-.03
Checking & Listening to Pupil Reading	.09	-.01	-.06	.19	.09
GRADE 5 FACTORS					
Giving Instructions at Board	-.11	-.08	-.21*	.14	-.03
Instructing Groups or Individuals	.11	-.03	.16	-.18	.05
Introducing Lesson	-.07	.02	-.03	.06	.02
Noninteractive Supervision	-.03	.09	-.17	.18*	.07
Circulating	-.20*	.13	.06	-.17	-.04
Discussing & Explaining Lesson	-.01	.20*	.07	-.08	.07

* $p \leq .10$

Table 181

Partial Correlations of BTES APPLE Factor Scores for Teacher Responses with Spring Outcome Scores Controlling for Fall Scores - Reading Tests

	CAT Reading	Reading Application	Decoding Total	Reading Achievement	Total Academic Reading
GRADE 2 FACTORS					
No Response	.02	-.00	-.09	-.05	.08
Positive Reinforcement Responses	.22*	.32*	.11	.25*	.22*
Instructional Feedback Responses	.30*	.28*	-.00	.10	.31*
Neutral Feedback Responses	.44*	.08	-.17	.03	.16
Strong Positive Reinforcement Responses	.26*	-.05	.21*	-.04	.05
GRADE 5 FACTORS					
Negative Reinforcement Responses (Behavior)	-.12	.04	-.19	.13	.05
Negative Reinforcement Responses (Academic)	-.13	.12	-.13	.04	.05
Neutral Feedback Responses	-.06	-.07	-.03	-.11	-.04
Positive Reinforcement Responses	-.05	-.10	-.10	-.05	-.08
Instructional Helping Responses	-.21*	.08	.07	-.05	.13

* $p \leq .10$

Reinforcement factor was positively related to all of the second grade reading achievement measures with the exception of decoding. The instructional Feedback Responses factor was also uniform in its positive relationship with reading outcomes at second grade. The only type of teacher response factor associated with improved decoding achievement was Strong Positive Reinforcement Responses. The most salient of the variables in this factor was the teacher response "Praise".

At the fifth grade level, only one of the Feedback factor scores appear to be related to reading achievement. Although the correlation was negative, the Instructional Helping Responses factor was significantly related to the CAT reading measure. This result seems to imply that teachers who need to provide help in reading are teachers whose lessons are too difficult or whose pupils need some type of instructional activity other than the one requiring teacher help.

Partial Correlations of Factor Scores from the Analysis of Instructional Context, Teacher Activities and Teacher Responses with Mathematics Outcome Measures

Instructional Contexts. The data has consistently shown that a set of teacher performance variables will not have the same relationship across instructional areas and grade levels. The differing relationships between context factors and mathematics achievement outcomes uphold this pattern (Table 182). The Independent Work by Class context factor was positively correlated with the second grade total mathematics outcome measure, but correlated negatively, though not significantly, with the mathematics achievement measures at fifth grade. Teacher Instruction of Class and Group Instruction factors had significant relationships to mathematics achievement

Table 182

Partial Correlations of BTES APPLE Factor Scores for Instructional Contexts with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	CAT Mathematics Concepts	CAT Mathematics Computation	Mathematics Application	Total Academic Mathematics
GRADE 2 FACTORS				
Teacher Instruction of Class	.05	.05	-.17	.10
Independent Work by Class	.09	.15	.08	.25*
Group Instruction	-.07	-.04	-.00	-.13
GRADE 5 FACTORS				
Independent Work by Class	.05	-.15	-.17	-.16
Teacher Instruction of Class	.21*	-.03	.08	.11
Group Instruction	.01	.09	.20*	.15

* $p \leq .10$

outcomes at fifth grade, but to none of the mathematics outcomes at second.

Teacher activities. Reference to Table 183, which presents the correlations of teacher activity factor scores with mathematics achievement outcomes, shows that few of these factors correlated with mathematics achievement scores at second grade. The two factor scores with significant findings were both correlated with the California Achievement Test Math Concepts. Being Available for Help to pupils as they needed it was positively correlated with mathematics concepts, while the Helping Interactions with Pupils factor had a negative relationship with it.

Five of the seven teacher activity factors for fifth grade had significant relationships to mathematics outcomes. Asking Questions about Problems, Introducing and Answering Questions about Lessons, Instructing Groups or Individuals, and Circulating all had significant positive correlations with one or more mathematics achievement measures. The At Desk factor was negatively correlated with the mathematics application test. These findings lead to the hypothesis that the more fifth grade teachers interact with pupils in mathematics instruction, the better their achievement outcomes will be.

Teacher responses. It seems of particular interest that an almost reverse pattern of the effect of teacher response on pupil outcomes occurs between grade levels and between reading and mathematics instruction. Table 181 illustrated the finding that teacher feedback responses of a variety of types were positively related to reading achievement outcomes at second grade, while these responses had no relationship to reading achievement at fifth grade.

Table 184 shows teacher responses in mathematics activities were not related to second grade achievement. On the other hand, the Verbal Reinforce-

Table 183

Partial Correlations of BTES APPLE Factor Scores for Teacher Activities with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	CAT Mathematics Concepts	CAT Mathematics Computation	Mathematics Application	Total Academic Mathematics
GRADE 2 FACTORS				
Introducing & Answering Questions about Lesson	-.14	-.05	-.09	-.19
Asking Questions about Problems	.19	.11	-.04	.09
Teacher Directed Instruction	-.14	.06	-.07	-.17
Instruction by Drill & Review	.09	.03	.04	.16
Helping Interactions with Pupils	-.25*	-.17	-.05	-.15
Available for Help	.28*	-.04	-.10	-.05
Checking & Explaining Errors	.06	.07	.08	.09
GRADE 5 FACTORS				
Asking Questions about Problems	.10	-.17	.40*	.15
Introducing & Answering Questions about Lessons	.37*	.15	.03	.22*
Instructing Groups or Individuals	-.01	.08	.22*	.18*
Circulating	.18*	-.01	.09	.09
At Desk	.01	-.02	-.27*	-.16
Checking Pupil Work	-.09	-.16	-.08	-.18
Class or Group Discussion	-.05	.06	.11	.06

* $p \leq .10$

Table 184

Partial Correlations of BTES APPLE Factor Scores for Teacher Responses with Spring Outcome Scores Controlling for Fall Scores - Mathematics Tests

	CAT Mathematics Concepts	CAT Mathematics Computation	Mathematics Application	Total Academic Mathematics
GRADE 2 FACTORS				
No Responses	.10	.08	.10	.02
Positive Reinforcement Responses	-.06	.01	-.08	-.03
Ignoring Responses	.04	.02	-.01	.04
Negative Reinforcement Responses	.05	.00	-.16	-.00
Questioning Responses	-.16	-.06	-.04	-.17
GRADE 5 FACTORS				
Negative Reinforcement Responses (Behavior)	.06	-.21*	.19*	-.01
No Response	-.16	-.14	-.18*	-.22*
Redirecting Responses	-.00	-.01	-.31*	-.07
Verbal Reinforcement Responses	.22*	-.07	.45*	.32*
Non-verbal Acknowledgement Responses	-.32*	-.25*	-.10	-.33*

* $p \leq .10$

ment factor was positively related to fifth grade mathematics outcomes. Negative or neutral feedback, as reflected in the Negative Reinforcement, No Response, Redirecting Responses and Non-verbal Acknowledgement factors, was negatively correlated with fifth grade mathematics outcomes. The only exception was a positive correlation between the Negative Reinforcement factor and the Mathematics Application test.

We cannot offer a definitive explanation for these differing findings with respect to the observational factor score variables. It can be asserted however, that studies which attempt to define the teacher performance characteristics which make a difference in pupil achievement will need to take into account the intervening variables of the age of the pupils being taught and the type of achievement objective. Teacher performance characteristics which affect achievement outcomes may, or may not, be critical for positive changes in pupil attitudes about school or self. Of interest in this regard is the extent to which performance characteristics reflected in these factor scores related to attitude outcomes.

Partial Correlations of Factor Scores from the Analysis of Instructional Context, Teacher Activities and Teacher Responses with Attitude Outcomes

In a review of the relationship between the factor score data and the attitude outcomes, it is important to keep in mind that the attitude measures, as well as all of the other measures that we have reported, are based on the classroom as the unit of analysis. The partial correlations reflect the relationship between factor scores for variables based on observations tallied across all target pupils and the classroom averages (based on all pupils) of the attitude and survey measures controlling for the Fall scores on these tests. In this discussion of the attitude outcomes, the reader should keep in mind that the factor score data represent what is happening to the class as a group rather than what is occurring with individual pupils.

Contexts. Table 185 reports the partial correlations of the context factor scores with the total attitude and total survey measures. None of the context factor scores significantly correlated with the fifth grade attitude measures. At second grade, we have the interesting finding that all of the factor scores had a negative correlation with one or more attitude outcomes. The reading factor, Group Instruction, was significantly negatively correlated with both the attitude (positive attitude toward reading and mathematics activities) and survey (positive attitude toward self) measures. The Group Instruction factor in mathematics lessons was also negatively related to the second grade survey measure. The conclusion which we can draw from these findings is that the more opportunity there is for pupils to demonstrate their achievement before the teacher and the group, the greater the chance that second grade pupils will view the activity and themselves in a more negative light. This hypothesis was supported to some extent by the positive correlation of the Teacher Instruction of Class mathematics factor with the survey measure, suggesting the possibility that there is perhaps less risk of self-disclosure in a class instructional setting in mathematics than there is in the group setting, or than there is in a class instructional setting in reading.

Teacher activities. The hypothesis that poor attitude outcomes are associated with teacher involvement with pupils in ways which might single them out, is supported somewhat by the types of teacher activity factors which have negative correlations with attitude outcomes in second grade.

Table 185

Partial Correlations of BTES APPLE Factor Scores for Instructional Contexts with Spring Outcome Scores Controlling for Fall Scores - Attitude Tests

Reading			Mathematics		
	Total Attitude	Total Survey		Total Attitude	Total Survey
GRADE 2 FACTORS			GRADE 2 FACTORS		
Total Class Instruction	-.18	-.28*	Teacher Instruction of Class	-.10	.35*
Group Instruction	-.23*	-.25*	Independent Work by Class	.02	.15
Individualized Instruction	-.15	-.15	Group Instruction	-.01	-.26*
GRADE 5 FACTORS			GRADE 5 FACTORS		
Independent Class Work	.09	.08	Independent Work by Class	-.05	-.08
Teacher Instruction of Class	.14	-.03	Teacher Instruction of Class	.18	-.10
			Group Instruction	-.08	.16

* $p \leq .10$

Table 186 reports negative correlations of the teacher activity factors of Circulating, Helping Interaction with pupils and Available for Help with the total survey measure. On the other hand, Checking and Listening to Pupils Read, Introducing and Answering Questions, Instruction by Drill and Review and Checking and Explaining Errors (mathematics) were positively correlated with attitude and self concept.

The relationship between teacher activity factors and attitudes at fifth grade support the contention that particular types of teacher activities in reading and mathematics are conducive to the development of either positive or negative attitude outcomes. In fifth grade, Giving Instruction at Board, Introducing the Lesson, and Asking Questions about Problems were activities with positive relationship to attitude and survey outcomes. On the other hand, the Circulating and Checking Pupil Work factors both imply opportunities for teachers to see how well pupils are responding to the assignment with the resultant possibilities of some type of negative or positive teacher feedback. These factors were both negatively correlated with attitude outcome.

Teacher responses. The correlations of teacher response factor scores with attitude outcomes (Table 187) shows a positive relationship between the factors Positive Reinforcement and Neutral Feedback in second grade reading and the total attitude at the end of the year. The Positive Reinforcement factor in mathematics lessons, on the other hand, did not correlate with total attitude, but the Negative Reinforcement factor had a very positive relationship to the survey measure. This high correlation between the Negative Reinforcement factor in mathematics and the total survey measure, especially since negative reinforcement was relatively uncommon

Table 186

Partial Correlations of BTES APPLE Factor Scores for Teacher Activities with Spring Outcome Scores Controlling for Fall Scores - Attitude Tests

Reading			Mathematics		
	Total Attitude	Total Survey		Total Attitude	Total Survey
GRADE 2 FACTORS			GRADE 2 FACTORS		
Noninteractive Supervision	.05	.04	Introducing & Answering Questions about Lesson	.21*	-.13
Discussing & Giving Instructions	.08	.19	Asking Questions about Problems	.13	-.03
Teacher Directed Instructions	.05	.13	Teacher Directed Instruction	-.06	-.00
Introducing & Answering Questions	.25*	-.14	Instruction & Drill by Review	.08	.24*
Circulating	.02	-.25*	Helping Interaction with Pupils	-.07	-.27*
Checking & Listening to Pupil Reading	-.02	.29*	Available for Help	-.37*	-.31*
			Checking & Explaining Errors	.29*	.42*
GRADE 5 FACTORS			GRADE 5 FACTORS		
Giving Instructions at Board	.26*	-.08	Asking Questions about Problems	.22*	-.02
Instructing Groups or Individuals	-.00	-.09	Introducing & Answering Questions about Lesson	.20*	.17
Introducing Lesson	.16	.25*	Instructing Groups or Individuals	.14	.12
Noninteractive Supervision	-.06	.03	Circulating	-.02	-.16
Circulating	-.25*	.03	At Desk	-.01	.05
Discussing & Explaining Lesson	-.11	-.06	Checking Pupil Work	-.20*	-.06
			Class or Group Discussion	-.01	.14

* $p \leq .10$

Table 187

Partial Correlations of BTES APPLE Factor Scores for Teacher Responses with Spring Outcome Scores Controlling for Fall Scores - Attitude Tests

Reading			Mathematics		
	Total Attitude	Total Survey		Total Attitude	Total Survey
GRADE 2 FACTORS			GRADE 2 FACTORS		
No Response	.04	-.17	No Response	-.02	-.18
Positive Reinforcement Responses	.25*	.06	Positive Reinforcement Responses	-.08	-.02
Instructional Feedback Responses	-.15	.01	Ignoring Responses	-.34*	.01
Neutral Feedback Responses	.25*	.08	Negative Reinforcement Responses	.06	.43*
Strong Positive Reinforcement Responses	.13	-.04	Questioning Responses	-.19	-.07
GRADE 5 FACTORS			GRADE 5 FACTORS		
Negative Reinforcement Responses (Behavior)	-.26*	-.02	Negative Reinforcement Responses (Behavior)	-.03	-.08
Negative Reinforcement Responses (Academic)	-.35*	-.16	No Response	-.07	-.15
Neutral Feedback Responses	.13	-.19*	Redirecting Responses	.12	-.01
Positive Reinforcement Responses	.13	-.55*	Verbal Reinforcement Responses	.24*	.10
Instructional Helping Responses	-.07	.14	Nonverbal Acknowledgement Responses	-.21*	-.11

*p $\leq$ .10

across all classrooms, suggests that teacher management by negative feedback to some pupils may assist the others to self-differentiation and an awareness of their more positive behavior. Absence of teacher feedback, as reflected in the Ignoring teacher response factor in mathematics, was negatively correlated with the second grade total attitude measure. Teacher response of some type is evidently important to pupil attitude; ignoring pupil behavior has potentially negative consequences for attitude about mathematics activities.

The Negative Reinforcement factors for both behavior and academic skills in reading both correlated negatively with attitudes of fifth graders. It is interesting that the Neutral Feedback and Positive Reinforcement factors in reading instruction had significant negative correlations with the survey measure. The only explanation that we can offer here is that the selectivity of the teachers with respect to the reinforcement of particular pupils affects the way children in the classroom, on the average, change in their self concept over the year. Even though reinforcement in fifth grade reading activities, whether positive, neutral or negative, was negatively correlated with one or the other of the attitude measures, the Verbal Reinforcement Responses factor in mathematics had a positive relationship to the total attitude measure. Nonverbal Acknowledgement was negatively related.

These data reporting the results of the correlations of factor scores with attitude and self concept measures lead to the general conclusion that the fidelity of teacher reinforcement of pupil behavior and the fairness and consistency with which it is applied has an important relationship to the growth or decline of attitudes of pupils about reading and mathematics and their self concepts.

APPENDIX D

Instructions for APPLE Observers in the Beginning Teacher Evaluation Study

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Instructions for APPLE Observers in the Beginning Teacher Evaluation Study

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OVERVIEW

The goal of classroom observations in the Beginning Teacher Evaluation Study (BTES) is to specify the observable teacher and pupil behaviors which affect pupil outcomes in learning. The APPLE (Anecdotal Proccessing to Promote the Learning Experience) observation procedures which you will be using have been developed by collecting natural classroom observations in over 150 classrooms of about 2000 elementary school children over a three year period.[1] The information about observable pupil and teacher behavior and the procedures for collecting classroom observations have been adapted to the goals of the BTES project. However, the kinds of behavior that each of the BTES APPLE observers will be recording will be very similar to those that were collected in the three year longitudinal study. You will be using, therefore, procedures that have been used by many other observers with children of the same age levels that you will be observing and in classrooms that will be similar to those in the original project.

GENERAL GUIDELINES

Each observer working in the BTES project should have some knowledge of the intellectual, social, emotional and physical characteristics of

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Lambert, Nadine M. The Stress of School Project, USPHS, NIH Grants MH14, 605-01, 02, 03, 04, 05, and 06.

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children in the age ranges to be observed, second and fifth grades. Such knowledge, along with previous experience in simple classroom observation and in assessment, are the two primary prerequisites for the observation task. Moreover, objective descriptions of the behavior of teachers and pupils are mandatory so that these behaviors can be classified later according to the APPLE lexicons.

Target Pupils for the Observation

Each observer will be given the names of children who have been randomly selected from each classroom for observation. Hopefully each teacher in anticipation of the observation day will have every child wear a name tag so that the target pupils will be easily identified.

Classroom Periods Designated for Observation

There should be no fewer than three periods of observation during the school day. The observer should consult the teacher, if this information is not available prior to the observation day, about the times when reading is taught (usually two sessions a day) and the times when mathematics is taught. These periods, plus any other periods that the teacher designates as ones in which the observer can observe pupil and teacher behaviors associated with reading and mathematics, will constitute the observation periods. Normally this will be four 1/2 hour periods a day, though there may be some classrooms where more periods will need to be observed.

What Activities or Behaviors Should be Recorded?

While the observation record describes pupil behavior and teacher-pupil interaction, it is important that the instructional role of the teacher be clarified. The observer, therefore, will need to note the teacher activity which initiates or accompanies the reading or mathematics lessons. Normally the observer will simply record what role the teacher takes at the beginning of an observation period or at the time of introducing a new lesson. These roles may include explanation of a procedure or a lesson, organizing the lesson activity, leading a lesson activity, conducting a discussion, lecturing, or leading a question and answer period. Procedures for making these notations of teacher activity will be described later in this manual.

After noting the general teacher activity, the observer will then make an observation record of the behavior of each pupil on the list of target pupils, including in each observation the mandatory information for behavior events which will be described later. Following this initial record of each pupil's behavior, the observer will continue to make observations, usually no less than two for each five minute period, and as many as needed to provide as complete a record as possible of the target pupils' behaviors.

What Activities or Behaviors Should Be Recorded?

Pupil behaviors. Almost any behavior of a child or children that comes to your attention may be considered. However, we are looking especially for the following:

1. Academic - Intellectual
    a. Signs of unusual strengths or weaknesses, including oral and written work, response to questions, teacher comments, etc.
    b. Change from usual level of performance
    c. Response to new methods, teacher, etc.
    d. Performance in various situations, including small group, individual and class instruction
2. Social - Emotional
    a. Usual method of relating to peers
    b. Changes in peer relations

   c. Aggressive, attention-getting, immature, or inappropriate behavior
   d. Successful coping with a difficult or potentially difficult situation
   e. Relationships with familiar adults - teachers, aides, etc.
   f. Relationships with other adults - principal, nurse, counselor, substitute teacher, etc.

3. General Behavior
   a. Attention level
   b. Restlessness
   c. Alertness

4. Physical Appearance (if out of ordinary, very good or very poor)
   a. General grooming
   b. Health
   c. Signs of fatigue
   d. Nutrition
   e. Stature (weight and height)

5. Consultation about Pupils
   a. Contacts with other school officials
   b. Teacher reports or requests for assistance
   c. Anything else you deem important. Be sure the reason for making the observation is obvious to others; otherwise it will appear that you have recorded a trivial event.

Teacher responses to pupil behavior events. Since one of the objectives of the BTES observations is to determine the nature of teacher-pupil interactions, each pupil behavior event must be accompanied by a description of the teacher response. In the APPLE Lexicon we have defined a fairly large number of teacher responses which have been observed to accompany pupil behavior. These descriptions will give you examples of the kinds of teacher behavior you are likely to observe. However, teacher responses may be nonverbal and sometimes the teacher is unaware of the pupil behavior or simply chooses to ignore it. Nonverbal responses such as "smiles," "notices," (without a particular facial expression) "frowns" or "ignores" should also be indicated when appropriate in order to have a complete record of the kinds of teacher interaction which accompany pupil behavior. For some pupil events, however, recording a teacher response may seem quite inappropriate; in these cases, the observer will simply indicate this by "not applicable" or "none" or by some other statement describing the event in the space for the record of the teacher response.

Teacher Behavior Which Initiates a Pupil Event. Quite often you are likely to observe the teacher saying something directly to a child, for example instructions to a lesson or a reminder about what the child should be doing. When such teacher behavior is directed at a target pupil, you should be certain that you are making a record of it along with the pupil response to the teacher.

What Position Should the Observer Take in the Classroom?

The observer will assume a role somewhere between participant observer and potted palm. Each observer is expected to become a familiar enough figure to the children that he will not attract unusual attention while entering and leaving the room. In the room, depending on the activities being carried on by the children and teacher, the observer should position himself for maximum visual access to the activities and behaviors of the children. This will sometimes involve the observer with the activities of the children; such involvement is permissible so long as the observer does not become a teacher's aide or take over the teacher's responsibilities. Acceptable involvement might include a short period of individual work with a student or small group, if this contact enables the observer to gather information about the students, such as academic skills, particular learning weaknesses or behavioral responses to specific tasks. However, the observer should avoid becoming identified in any role other than that of the observer. Activities such as described above would be the exception rather than the rule.

How Often Should Observations Be Made?

The rule of first making an observation of each target pupil followed by at least two observations for each five minute period may have to vary depending on the classroom in which you are observing. While in the classroom or with a group of children, you should record observations as frequently as possible. Under no circumstances, however, are you to make a running commentary about occurrences in a classroom or running comments pertaining to a particular child. Therefore, although you may record observations as quickly as you can write, each observation describes a unit of behavior and must be able to stand alone. This independent, primary unit of behavior is called an Event in the APPLE observation and data processing system.

For each observation period the number of observations for each pupil will depend upon the number of Events which are observable and the frequency with which the pupils' learning context changes. Whenever the pupil's behavior is judged to suggest a significant Event, the observer should make a record. Reference to the Lexicon and to the instructions which follow will provide each observer with a reasonably good idea about the range of behaviors which can be observed and those which can be included in the observation record. The observer should make a record each time the pupil's learning context changes, such as, for example, a change from a reading group to a seat-work assignment. Following the rule of making an observation for 1) each significant behavioral event plus 2) every change in a pupil's learning context will provide a rich source of information about pupil behaviors in reading and mathematics along with the teacher interactions which accompany these pupil behaviors.

How Should Pupil Activities and Learning Contexts be Recorded?

Each time the observer notes an event, the observation form provides spaces where the observer specifies the PUPIL ACTIVITY and CONTEXT for that event. A description of each of these aspects of observed behavior and the labels to be used can be found in the section of this Manual entitled USING THE OBSERVATION FORM.

INFERENCE IN OBSERVATION

How Will You Make Clear the Intent of Your Observations?

The behavior which is recorded may be considered to belong on a continuum of descriptive precision ranging from simple statements about overt acts, "David put his coat on" to inferences regarding the intent or meaning of a behavior without reference to the act itself, "David is feeling insecure." Making inferences in observational procedures is unavoidable. Whenever you choose to record a particular occurrence, you have inferred something about the behavior of the child which caused you to make a record. Some uses of inference are better than others, however, and you will usually want to be somewhere in the middle of the continuum by adding important facts which struck your attention, rather than at either extreme. For example this observation record describes what the child did, what the classroom circumstances were at the time and what inference you made about the behavior. "David put on his coat. It is 75° in the classroom and he is the only one with his coat on -- maybe feeling insecure." In the example given, enough accessory information is provided to identify the act of David putting on his coat as unusual. The observer makes an inference and later this inference is identifed as such in the data processing record.

There are some types of inferences you will want to avoid, however, as well as some you will need to make explicit. Three types of explicit inferences you might make could be statements about:

1. Possible causal relationships
2. Inferred personality characteristics.
3. Relevance of observation to evidence of a stressful behavior or classroom situation.

When you do make such inferences, please observe these rules:

1. Do not embed your inference in the observation itself. Separate the inferential statement.

> BAD: Don, a dependent child, cried when his mother left the room.
>
> BETTER: Don cried when his mother left the room. (Probable sign of dependency).

2. When the inferences are made, the observation is labeled on the basis of the inference rather than the body of the observation. In the above example this is important because the first statement should probably be called CRYING while the second should be labeled DEPENDENCY NEEDS. It is assumed that in this case the observer considered the dependency behavior more important than the crying.

3. Do not generalize from a single observation.

> EXAMPLE: Steve hit Pete without apparent provocation. (Steve has a large reservoir of hostility).

In this example we assume that the observer has seen examples of Steve's hostility before so that evidence need not be cited in support of this. It is the responsibility of the observer, therefore, not to generalize from the first occurrence of a particular behavior.

4. Never make inferences about psycho-dynamic constructs such as "reality testing," "body image," "acting out," etc.

USING THE OBSERVATION FORM

The observation as it is actually recorded is called an Event. The **Event** is defined as anything which an observer sees a child do; anything which was observed to happen to the child or which was said of him by an adult or child in the school who knows him as a member of the classroom group or as an individual; any behavior of the teacher specifically directed toward the child; or additional information such as family status or medical history. In the most usual case you will be writing a single observation (Event) in each of the three sections of the observation page.

Please write your observations in ink, preferably blue or black. Do not use either pencil or red ink. Pencil too easily becomes smudged with the handling your observation forms will receive during coding and key-punching, and red ink is reserved specifically for coding each pupil's record. Since someone else will have to read what you have written, you must write legibly. If your handwriting is habitually messy or difficult to decipher, it will be worse under the pressures and inconvenienes of recording in the classroom. Therefore, you may wish to print rather than to write in script.

Identifying Information

Refer to the sample observation form. In the upper right hand corner you will find space to fill in your name, the date on which you are making the observation, the name of the teacher of the child or children you are observing, and the grade level at which you are observing. You will use as many of these sheets as needed during an observation. Numbering each page in sequence in the spaces provided will help you keep track of your observations for a period or a day. You should always start a new sheet on a new observation day or when you change from one classroom and/or teacher to another.

Mandatory Entries

At the top of each section on the observation form, you will see several headings starting with CODE, EVENT NAME, and SUBJECT. The headings, CODE, SUBJECT, PUPIL ACTIVITY and CONTEXT constitute the mandatory entries of the observation form. Each box under each of these headings must be completed for every observation. EVENT NAME, TEACHER ACTIVITY and TEACHER RESPONSE will be filled in by a project staff member after you have completed the observations. When a particular mandatory entry is not applicable to the observation, put NA in the appropriate box. This situation will occur if, for example, you record a teacher report about a child. Do not leave any mandatory entry blank. The keypuncher will be forced to stop work and try to determine what should go there, thus slowing the punching procedure. An explanation of each of the mandatory entries along with the specific labels which may be used with each follows.

CODE: The code referred to here is the BTES ID code assigned to the pupil. This will be found on the list of target pupils you will receive prior to your observations. Put this number in the box.

SUBJECT: The first mandatory entry is SUBJECT. This refers to the pupil in the observation being recorded. Although there may be other pupils in the observation, the SUBJECT is the principal pupil in the event.

PUPIL ACTIVITY: This entry refers to the content of the pupil's instructional or classroom program in progress at the time the event is noted. A list of frequently used activities is provided below. These are suggestions for what might be recorded. In all cases, make as specific record as you can to describe the child's learning activity or other classroom activity.

CONTEXT: The entry CONTEXT provides a description of different school settings which may have important influences on the child's school behavior. Context is determined not by the event itself but by the school situation in which the event occurs. Contexts designated T are those situations in which the teacher is directing the activity. Contexts designated A are those in which another adult such as an aide or volunteer parent is involved. Those designated I are situations in which the pupils are functioning independently or the teacher's directions. Explanations and examples of the several different CONTEXT entries follow.

Abbrevition	Context Name	Definition
T-CLASS A-CLASS	Teacher-Class Adult-Class	Teacher or other adult is directing the activity and the entire class is participating CLASSROOM EXAMPLE: Flag, salute, story time, sharing, directions, lessons. PLAYGROUND EXAMPLE: Games directed by teacher in which whole class is participating.
T-GROUP A-GROUP	Teacher-Group Adult-Group	The class is divided into groups and the teacher or other adult is directing the activity of the group in which the child for whom the observation is recorded is participating. CLASSROOM EXAMPLE: Oral reading group, math group. PLAYGROUND EXAMPLE: A game under the direction of the teacher but not involving the entire class.
T-INDIVID A-INDIVID	Teacher-Individual Adult-Individual	The teacher or other adult is directing the activity of an individual student, and not the rest of the class. CLASSROON EXAMPLE: The teacher has called a student to her desk for special help and an observation is recorded for him during this time.

Abbreviation	Context Name	Definition
T-INDIVID A-INDIVID	Teacher-Individual Adult-Individual	PLAYGROUND EXAMPLE: The teacher is giving instruction to a single child about a game and an event is recorded for that child during this time.
I-CLASS	Independent-Class	The entire class is working or playing independently of the teacher's direction. Teacher usually present but not directing. CLASSROOM EXAMPLE: Math workbook assignments, silent reading assignment. PLAYGROUND EXAMPLE: Free play during the period devoted to physical education.
I-GROUP	Independent-Group	A group of students is working or playing independently of the teacher's direction. CLASSROOM EXAMPLE: A group of students working on independent reading assignments (workbooks). Note: The teacher will probably be instructing another group during this time. An event recorded for a child in the instructed group would be labeled T-Group. PLAYGROUND EXAMPLE: A group has formed spontaneously or has been formed by the teacher and is now playing free from the teacher's direction.
I-INDIVID	Independent-Individual	An individual student is working or playing independently of the teacher's direction and also independently of the rest of the class. CLASSROOM EXAMPLE: An observation is recorded for a student who is working alone on a programmed reading activity; any type of individualized activity which the child performs primarily without teacher direction. PLAYGROUND EXAMPLE: The student is alone on the playground; student is practicing alone some physical education skill.

Abbreviation	Context Name	Definition
TRANSITIONAL	Transitional	Times which are transitional between classroom or playground activities. CLASSROOM EXAMPLE: Changing activities, changing from oral to silent reading group, getting ready for lunch. PLAYGROUND EXAMPLE: Lining up to come inside, changing games.
TEST	Test	Times, either in classroom or on the playground, during which tests are given by the teacher.

CONTEXT Time: Start _____ End _____ : It is important in the BTES observation record that the observer record the duration of each context for a particular subject. Ordinarily, the same context continues through an observation period; however, there are times when the teacher dismisses a reading group, for example, and the children move on the their desks to undertake a new learning activity. For each initial event for a targeted pupil in the beginning of an observation record, the observer should record the time of the beginning of that context. If the context changes, it is mandatory that the observer make a record of a new event for a pupil indicating the new context and the time at which it began. These time records may be made only once for each child at the beginning of an observation period, but additional time entries will accompany each new context. At the end of the observation period the observer can fill in the ending time for each time entry which may be simply the time at which the observation period ended.

DESCRIPTION OF EVENT: You now have 3 lines in which to record the actual observation. Please follow the few guidelines below when writing your observations. They will be easier for you to encode and easier for the keypuncher to transcribe if you do.

1. Record the sequence of an event in chronological order.

> BAD: Allen and Steve were reprimanded by teacher for not being quiet during spelling lesson.
>
> BETTER: Allen and Steve were noisy during spelling lesson. Teacher reprimanded them.

2. NEVER make a running commentary on classroom activities. Separate the anecdotal material into events which can stand alone. If an incident seems to consist of more than one event, still record each probable event in a separate space.

3. Report the circumstances surrounding the event in sufficient detail, including precipitating factors, prior conditions, consequences, follow up, etc. If the event itself, complete with all the surrounding information, is too long to record in a single 3 line section, you may continue it in the following section, indicating that it is the same event by scratching out the horizontal double line. You may find that in reporting a particular incident in sufficient detail you will have more than one event. In the latter case be sure to separate the events on the observation form.

TEACHER ACTIVITY: The labels for TEACHER ACTIVITY in the space at the top of each observation record will be completed by the project staff. On the line opposite "Teacher activity", the observer should describe the teacher's activity which accompanies the pupil event. Normally this indicates simply the role of the teacher during the observation period. The following list of roles will give the observer an idea of what should be recorded in this line.

Examples of teacher activities:

Leading a discussion
Lecturing
Explaining a process, procedure or a lesson
Providing information about an activity or lesson
Organizing an activity or lesson
Conducting a question and answer session
Leading a game
Leading an activity
Reviewing the work of a group of pupils
Reviewing the work of individual pupils
Standing, waiting for silence
Calling class to attention
Moving around the room assisting children with assignments
Available at desk to help individual pupils
At desk working, relatively unavailable to pupils
Teacher not in the room
Conducting a visual demonstration (models, pictures)
Conducting an audio-visual demonstration (movies, film strip)
Conducting an audio demonstration (records, tape recordings)

The project staff will develop the lexicon of teacher activities on the basis of the records of the observers. It is therefore important to describe the teacher activity as specifically as possible. Normally the teacher's activity, like the context will not change often during an observation period. In order to save time during observation periods, the observer may wish to make a record of the teacher activity once to keep track of it, and then fill in the space for each event on the observation record after the observation period is over. Only changes in teacher activities need to be recorded, but teacher activity should be as specific as possible to the pupil learning and behavior events.

TEACHER RESPONSE: The labels for TEACHER RESPONSE will be recorded by the project staff in the space at the top of each observation. The observer may wish to refer to the Lexicon for examples of teacher behavior which have been observed in the development of the APPLE observation system. The observer will note that many of these Lexicon terms describe ways teachers reinforce, positively or negatively, pupil behavior in the classroom. Other kinds of teacher response are also defined. For each pupil event the observer must record the teacher response on the appropriate line. In the case where a teacher behavior initiates an event, the observer must also record the pupil response. In the case where the teacher response is non-verbal, it is important that the appropriate description of non-verbal behavior be made. Frowns, smiles, noticing but not commenting, rewarding with lifesavers, ignoring behavior, or unable to observe behavior, would be examples of non-verbal teacher behavior which might accompany a pupil event. Please be as specific as possible in making a record of the teacher response. If there is no response or no way to make a record of the teacher response put "none" in the space opposite "Teacher Response."

QUALITY OF PUPIL BEHAVIOR: In this space for each observation the observer is asked to rate his judgment of the pupil's behavior with respect to the classroom activity taking place at the time of the observation. A "+" rating would be assigned to positive, productive, involved behavior. A "-" rating would be assigned to an event in which the pupil behavior was non-productive, in which the pupil failed to understand a concept, or failed to get an assignment. A "O" would be used when the quality of the behavior is indeterminate.

COMPLETING THE OBSERVER SUMMARY REPORT

Purpose of the Summary Report

Many teachers participating in the BTES project have requested the opportunity to discuss the day's activities with the observer at the conclusion of his observations. The Summary Observation Report was prepared to provide a systematic method for reporting back to teachers what general things were observed in each observation period as well as for checking with teachers to be sure that no important information about the target pupils' learning experiences have been omitted.

Description of Entries to be made on the Form

The material to be completed at the top of the form is self-explanatory. Note that there are three sets of blanks provided for the daily attendance record of the class and target pupils. At the left side of the page are spaces to indicate the class enrollment by ethnic status. After this column is a set of blanks to enter the class attendance record of the day of the observation. At the right side of the form are spaces in which the names of the children to be observed are entered and following each space is a "P" to be circled if the child was present and an "A" to be circled if the child was absent. Unless a child leaves during the day of the observation, this attendance record would be the same on the the observer Summary Report for each observation period.

Next the observer completes the observation summary. At the left of the summary table are spaces for the child's name and code number. This should be available from the list of target pupils which you will have prior to the observation. Next is a section headed "For each observed pupil during observation period what was." Under this section the observer should record the primary PUPIL ACTIVITY listed for the observations he made for each target pupil. In the next column the observer records the materials that the child was using taking care to note the name of the book and the page number if possible. If more space is needed the back of the form can be used. Under the heading "Focus of Learning" the observer should indicate in as much detail as possible what the specific learning activity of the child was during the observation period. This is an amplification of the "primary classroom activity" column and provides the observer with a chance to ask the teacher to state what specific reading or mathematics concepts or skills she was expecting the child to learn. Examples of specific reading skills might be "beginning consonants," "ending blends," "making inferences," "speed reading." Examples of specific mathematics skills might be "zero difficulty in two place multiplication," "long division," "the 9's multiplication table," "counting with concrete objects for addition with sums to 20." Obviously the space is cramped for a long description, but try to write in enough so that it is possible to determine the way in which the teacher describes what she is hoping the child will accomplish in the reading or mathematics learning.

The next section refers to a judgment by the observer as to the extent of the time during the observation that a child was productively engaged in whatever classroom activity occupied him. These activities can be ones which the teacher directs primarily, or they can be activities which the pupil initiates such as undertaking a special assignment when classroom work is finished. It will be impossible to make an exact time estimate for this entry; however, make either a "number of minutes" or a "percent of time" estimate on the basis of your observations.

Completing this as soon after the observation as possible would increase the accuracy of the time estimates.

The final two columns refer to the nature of the learning activites during the observation period. It is important to determine the extent to which learning activities were structured for each child. An example of a very structured learning activity would be a programmed reading lesson, or a mathematics workbook. An example of an unstructured activity would be a free reading period where a pupil selected whatever he wanted to do. Remember that this is an observer rating and that you will have to use your best judgment as to the nature and extent of the structure of the learning. The final column is used to indicate the extent to which a child's learning activity was the same or different from other members of the class.

Discussion of the Observation Record with the Teacher

You and the teacher may have time to review the observation record toward the end of the day. It will be more appropriate for you to share the summary report than the individual observations. The teacher can assist you to determine the nature of the material and the focus of the learning activity. The teacher's knowledge of the assigned work in class should assist in making ratings of structure and differentiation. The productive time estimates will probably be yours, however, and can be shared with the teacher for her information.

If the teacher makes important comments about any of the pupils during the review period, the observer can make an observation record of them. They will be encoded later like the rest of the observations and enter the pupil record. Examples of comments which may be important will be those which describe changes in pupil behavior since the beginning of the school year or clarify the meaning of behavior which occurred during the day. These opportunities for teachers to contribute to the sample observation record are important ones and the content of them can be retained on either the Observation Form or the Observer Summary Report.

PUPIL ACTIVITY

READING ACTIVITIES

Assigned silent reading
Assigned writing
Comprehension-literal facts
Comprehension - main ideas
Creative writing
Dictionary skills
Dictation
English
Grammar
Oral reading
Penmanship
Phonics
Practice spelling
Punctuation
Readiness Activities
Reading workbook - skills unspecified
Recreational reading
Spelling
Spelling workbook
Syllabification
Word meaning

MATHEMATICS ACTIVITIES

Addition
Basic facts
Decimals
Division
Fraction
Geometry
Graphing
Measurement
Money
Multiplication
Percent, ratio probability
Relationships
Subtraction
Time
Word Problems

ACADEMIC ACTIVITIES other than reading and mathematics

Anthropology
Art
Book Report
Colors
Drama, Play
Ecology
Film Strip, Movie
Food Study
Geography
Physical Education
Shapes and Forms
Social Studies

SKILL DEVELOPMENT

Blocks
Clapping
Clay
Coloring
Cooking
Crafts
Dancing
Freeplay and freetime
Games
Marching
Body Movement
Music
Painting
Playhouse
Recess
Records
Rhythm
Singing
Speech
Story
Tell-a-story

TRANSITIONAL ACTIVITIES

Transitional
Clean up
End of the day
Line up
Quiet
Rest
Snack, milk-time

OPENING ACTIVITIES

Pledge
Roll-call
Beginning of day activities
Sharing

MISCELLANEOUS ACTIVITIES

Assembly
Conference
Discussion
Election
Individual Activities
Library
Lunch
Party
Weekly Reader
Individual activity done at a desk

EVENT NAMES

ACADEMIC PERFORMANCE, ABILITIES AND INTERESTS

Ability
Academic Performance
Activities
Concept Learning
Convergent Production
Divergent Production
Evaluation
General Knowledge
Interests
Intellectual Functioning
Language
Listening Comprehension
Memory
Number Concepts
Oral Reading
Phonic Skills
Problem Solving
Reading Comprehension
Reading Vocabulary
Shapes and Forms
Test Performance
Vocabulary

SOCIAL INTERACTIONS

Aggression
Anti-Social Behavior
Care-Taking
Competition
Conformity
Controlling Behavior
Copying
Fighting
Imitation
Meddling
Place in Class
Play Behavior
Physical Contact
Pupil Help
Rivalry
Sexual Behavior
Shyness
Social Relationships
Speaking
Tattling
Teasing

ORIENTATION TO INSTRUCTION

Attention-Getting Behavior
Attentiveness
Boredom
Cheating
Conduct
Cooperation
Daydreaming
Direction-Following
Disengagement
Disruptive Conduct
Distractibility
Diversionary Tactics
Engagement
Egress
Failure to Respond
Impertinence
Inattention
Participation
Punctuality
Questioning
Reassurance
Resistance
Sitting Behavior
Student Wish
Talking
Volunteering
Wandering
Work Habits

AFFECTIVE BEHAVIOR

Affect
Anger
Bizarre Behavior
Complaining
Crying
Enthusiasm
Fantasy
Frustration
Giggling
Hurt Feelings
Nervous Habits
Sulking
Tantrum
Whining
Yelling

EVENT NAMES

PERSONALITY TRAITS AND ATTUTUDES

Adjustment
Anxiety
Attitude
Decision-Making
Defensiveness
Dependency
Fear of Failure
Independence
Maturation
Mood
Persistence
Personality Characteristics
Personality Type
Possessions
Responsibility
Self-Awareness
Self-Concept
Sex Attitude

FAMILY HISTORY AND CHARACTERISTICS

Adoption
Alcoholism
Child Care
Conference Behavior
Death
Divorce
Education History
Family Background
Family Concept
Family Constellation
Family Relationships
Family Situation
Foreign Language
Marital Status
Occupation
Over Protection
Parental Pressure
Parental Request
Place in Family
Race
Rejection
School Support

PHYSICAL CHARACTERISTICS AND ACTIVITY

Activity Level
Attire
Auto-Erotic
Eating Behavior
Fatigue
Handedness
Hearing
Hunger
Impulse Control
Motor Behavior
Neurological Factors
Organic Signs
Physical Appearance
Physical Coordination
Restlessness
Sleep Behavior
Sucking Behavior
Toilet Behavior
Vision
Visual-Motor Organization

HEALTH AND ILLNESS

Hospitalization
Illness
Injury
Medical History
Medical Treatment
Medication
Nosebleed
Physical Complaint
Physical Condition

ADMINISTRATIVE-OTHER

Administrative Intervention
Adult Management
Attendance
Observer Judgement
Recommendation
Scheduling

TEACHER EVENT NAMES

TEACHER STRATEGIES

Discipline
Ignoring
Individualized Instruction
Inhibition of Communication
Instructing
Physical Punishment
Redirection
Seating
Teacher Acceptance
Teacher Criticism
Teacher Defeat
Teacher Encouragement
Teacher Help
Teacher Intervention
Teacher Management
Teacher Mediation
Teacher Praise
Teacher Reassurance
Teacher Reprimand
Teacher Reward
Teacher Warning

TEACHER ATTITUDES

Teacher Affect
Teacher Change
Teacher Concern
Teacher Confidence
Teacher Disappointment
Teacher Judgment
Teacher Resistance

TEACHER COMMUNICATIONS

Parent-Teacher Communications
Teacher Complaint
Teacher Information-Giving
Teacher Request